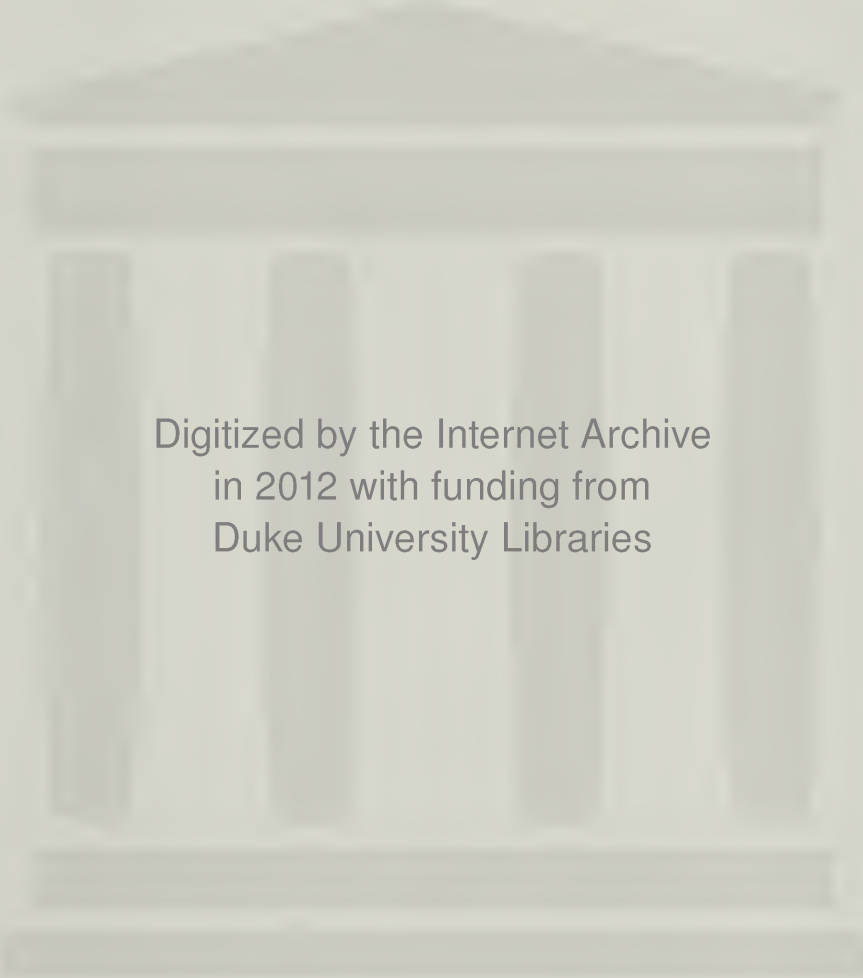


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Bulletin of Duke University 1972-1973

The School of Forestry



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1972-1973

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Officers of the University Administration

General Administration

Terry Sanford, J.D., LL.D., D.H., L.H.D., D.P.A., *President*
John O. Blackburn, Ph.D., *Chancellor*
Frederic N. Cleaveland, Ph.D., *Provost*
Charles B. Huestis, *Vice President for Business and Finance*
William G. Anlyan, M.D., *Vice President for Health Affairs*
Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*
Gerhard Chester Henricksen, M.A., C.P.A., *Vice President and Treasurer*
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John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*
James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*
*Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*
Thomas F. Keller, Ph.D., *Vice Provost*
Joel L. Fleishman, LL.M., *Vice Chancellor for Public Policy Education and Research;*
Director of Institute for Policy Sciences and Public Affairs
Benjamin Edward Powell, Ph.D., *Librarian*
Clark R. Cahow, Ph.D., *University Registrar*
J. Peyton Fuller, A.B., *Controller*
Rufus H. Powell, LL.B., *Secretary of University*
Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Assistant Treasurer*
Victor A. Bubas, B.S., *Assistant to the President*
A. Kenneth Pye, LL.M., *University Counsel*

*Leave of Absence 1971-72.

School of Forestry Administration

Charles William Ralston, M.F., Ph.D., *Dean of the School of Forestry*
Fred Myerle White, M.F., *Director of the Duke Forest and Assistant to the Dean*
Leon Edward Chaiken, M.F., *Director of Admissions*
Roger Fabian Anderson, M.S., Ph.D., *Director of Graduate Studies in the Department of Forestry of the Graduate School*

School of Forestry Faculty and Staff

Roger Fabian Anderson (1951), M.S., Ph.D., *Professor of Forest Entomology*
Robert Lloyd Barnes (1965), M.F., Ph.D., *Professor of Forest Biochemistry*
Leon Edward Chaiken (1952), M.F., *Professor of Forest Management*
Roger C. Chapman (1969), M.F., M.S., *Assistant Professor of Biometry*
Frank J. Convery (1971), M.S., Ph.D., *Assistant Professor of Forest Economics*
Ellwood Scott Harrar (1936), M.S., Ph.D., *James B. Duke Professor of Wood Science*
Henry Hellmers (1965), Ph.D., *Professor of Botany*
Frederick Charles Joerg (1947), M.B.A., *Professor of Forest Management*
Kenneth Richard Knoerr (1961), M.F., Ph.D., *Associate Professor of Forest Meteorology*
Paul Jackson Kramer (1931), M.Sc., Ph.D., *James B. Duke Professor of Botany*
Charles William Ralston (1954), M.F., Ph.D., *Professor of Forest Soils*
William James Stambaugh (1961), M.S., Ph.D., *Associate Professor of Forest Pathology*
Fred Myerle White (1959), M.F., *Assistant Professor of Silviculture*
David Owen Yandle (1967), M.S., Ph.D., *Associate Professor of Forest Mathematics*
James Edward Wuenschel (1970), M.S., Ph.D., *Assistant Professor of Forest Ecology*

Associate Faculty

Donald J. Fluke, Ph.D., *Professor of Zoology*
Aubrey W. Naylor, Ph.D., *Professor of Botany*
Joseph J. Spengler, Ph.D., *James B. Duke Professor of Economics*

Adjunct Faculty

Edgar W. Clark, Ph.D., *Adjunct Associate Professor of Forest Entomology*
Charles S. Hodges, Jr., M.F., Ph.D., *Adjunct Associate Professor of Forest Pathology*
Louis J Metz, M.F., Ph.D., *Adjunct Associate Professor of Forest Soils*
Fred M. Vukovich, Ph.D., *Adjunct Associate Professor of Forest Meteorology*

Staff

Patricia S. Rorie, *Recorder and Secretary to the Dean*
E. Otto Griffin, Jr., *Superintendent, Duke Forest*
Edwina Johnson, B.S. in L.S., *Librarian, Forestry-Biology Library*
Sue P. Hicks, *Secretary, Duke Forest*
Nancy A. McMannen, *Secretary*
Jo W. Russell, *Secretary*

Faculty Emeriti

James Granville Osborne, B.S., *Professor Emeritus of Forest Biometry*
Albert Edward Wackerman, M.F., *Professor Emeritus of Forest Utilization*
Frederick Adolphus Wolf, Ph.D., *James B. Duke Professor Emeritus of Botany*

School of Forestry Calendar 1972-73

1972

September

8/31-9/1	Consultation with advisers for new students
2	Saturday—Registration and matriculation for all students who have not preregistered in the School of Forestry
5	Tuesday—Fall semester classes begin

November

22-24	Thanksgiving Break
27	Monday—Classes resumed

December

11	Monday—Fall semester classes end
14	Thursday—Final examinations begin
21	Thursday—Final examinations end

1973

January

11-12	Consultation with advisers for new students
13	Saturday—Registration and matriculation for all students who have not preregistered in the School of Forestry
15	Monday—Spring semester classes begin

March

19-23	Spring Break—Spring Field Trips
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April

27	Friday—Spring semester classes end
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May

1	Tuesday—Final examinations begin
8	Tuesday—Final examinations end
13	Sunday—Baccalaureate and Commencement





General Information

Duke and the School of Forestry

Duke University, located at Durham, North Carolina, comprises Trinity College, The Woman's College, the School of Engineering, the Graduate School, and the professional schools of Forestry, Divinity, Law, Medicine, Business Administration, and Nursing. The University dates from 1838, when Union Institute was founded in Randolph County by the Methodists and Friends. In 1851 the institution became Normal College, one of the first schools in America for the training of teachers. In 1859 the name was changed to Trinity College and so continued until 1924, when the College became a part of Duke University.

By virtue of an indenture of trust, executed December 11, 1924, by James Buchanan Duke, there was a great benefaction, providing for hospitalization, church work in rural communities, and education. The principal feature of the educational provision was the creation of Duke University.

The University, with a student body totaling 8,000, occupies two campuses. The Woman's College campus of 108 acres was formerly the campus of Trinity College. About a mile west are the newer units of the University, known as the West Campus, totaling 467 acres. It was first occupied in September, 1930.

Forestry at Duke University began early in 1931 when the Duke Forest was placed under intensive forest management and forestry research was initiated. An academic-forestry curriculum, designed for men and women intent upon pursuing the study of forestry as a profession, was organized in Trinity College of Duke University in 1932. This program was enlarged in 1952 and now includes more than sixty cooperating colleges and universities. (See pages 16-17.)

In 1938 the School of Forestry was organized at the graduate level and a curriculum was offered leading to the degree of Master of Forestry. Work leading to the degree of Doctor of Forestry has been offered since 1940. The School has been fully accredited since its origin. A degree in forestry at the undergraduate level is not offered at Duke University.

Graduates of recognized colleges and universities, professional schools of forestry, and other students who meet the entrance requirements of the School (see page 19), may enroll in forestry programs leading to the professional degrees—Master of Forestry and Doctor of Forestry. The Department of Forestry in the Graduate School also offers graduate work in certain aspects of forestry leading to the degrees of Master of Science and Doctor of Philosophy. This work is available to graduates of schools of forestry of recognized standing, and to college or university graduates holding a bachelor's degree. All applicants will be considered without regard to race, color, religion, sex, or national origin.



2

Program Information

Related Fields

Basic scientific or professional programs of study are available in the following fields of forestry and related natural resources. Interdisciplinary programs between fields within the School of Forestry and those in other departments of the University also are possible and strongly encouraged.

Biological Science

Forest Ecology
Tree Physiology and Biochemistry
Forest Pathology
Forest Entomology
Dendrology and Wood Anatomy

Environmental Science

Forest Soils
Forest Meteorology and Biometeorology
Wildland Hydrology

Statistics and Operations Research

Biometry and Statistics
Mensuration
Operations Research

Economics and Management

Natural Resources Economics and
Policy
Forest Management

With exception of forest management, study in all of the above fields can be pursued in programs for a M.S., A.M., or Ph.D. degree in the Department of Forestry of the Graduate School, or in a professional program for a M.F. or D.F. degree from the School of Forestry. Work in forest management is in professional M.F. and D.F. degree programs of the School of Forestry. Students contemplating careers in teaching and research are strongly urged to follow courses of study in the Department of Forestry in the Graduate School.

In addition, the following special management or business-oriented programs of study leading to the M.F. degree are available in the School of Forestry: Post Liberal Arts and Science Program, Business Management Program, Forest Protection Program, Cooperative Forestry Program, and Natural Resource Ecology and Environmental Management Program.

Detailed information on these special programs is given under the Master of Forestry Degree and the Cooperative Plan of Study sections in this *Bulletin*.

Courses available in the various fields of forestry and related natural resources are indicated in a later section of this *Bulletin*.

Master of Forestry Degree

The requirements for the degree of Master of Forestry (M.F.) are governed by the extent of the student's previous professional training. Normally, students who have earned the degree of Bachelor of Science in Forestry, or the equivalent, from an accredited school of forestry, may complete the requirements for the M.F. degree in one academic year. Students who have had no prior professional training in forestry are required to complete five semesters of resident study. Graduate work of equivalent grade done in residence at other institutions may, with the approval of the faculty, be accepted as credit toward the degree, but a minimum of one year of residence at Duke University is required.

The submission of a thesis for the M.F. degree may be required. With the approval of the faculty, an acceptable report on a special study may be submitted in lieu of a thesis, credit for which will not exceed three units. Four copies of the thesis, typewritten and bound in accordance with regulations set forth by the faculty, must be deposited with the dean of the School of Forestry on or before May 15 of the academic year in which the student expects to obtain the M.F. degree.

A student who has not completed his thesis while in residence must submit an acceptable manuscript to the faculty within a period of two years following the termination of his residence.

No student may take less than 14 nor more than 18 units of credit per semester without special permission of the faculty (see page 24).

Post-Liberal Arts and Science Program. Men and women who are college graduates but have had no prior professional forestry training may be admitted



to programs of study leading to the degree of Master of Forestry. A minimum of five semesters of work in residence is usually required, including the core courses listed below.

These courses normally are completed during the first year of residence. However, students lacking prerequisites for specific courses may postpone such courses until the prerequisites have been completed.

Core Courses

	<i>Units</i>
Tree Growth and Development (For. 205)	3
Soils & Forest Resources (For. 261)	3
Resource Economics and Policy (For. 269)	3
Forest Ecology (For. 243)	3
Dendrology (For. 241)	3
Careers in Natural Resources (For. 200)	0

During the latter part of the first year, each student will be requested to designate the field (or fields) he wishes to pursue for a major. After the student has designated his field of interest, he will be assigned a faculty adviser who, in consultation with the student, will develop a program of study in a manner similar to that described under the Post-Professional Program (see below).

Any student who does not earn a grade of *E* or *G* in at least six units of work in the first academic year will not be permitted to enter into the work of the second year.

Post-Professional Program. Students with satisfactory undergraduate professional training qualify for advanced study and research in the various disciplines of forestry under this program. A specific study plan is developed for each student through consultation with a faculty advisory committee. For the student planning a managerial career in the general area of forest production (and where the Master of Forestry is planned as a terminal degree), his program of study usually consists of courses and seminars, with a major portion of the work concentrated in the area of the student's interests. For the student with research interest, the study plan is oriented within the subject matter field of interest toward the furtherance of a research career, or toward preparing him for academic training beyond the master's level.

A number of courses offered in other departments of the University are open to qualified students in the School of Forestry. One or more of these may be included in a student's study plan when considered advisable by his advisory committee.

A minimum of 30 units, in which the student must earn a grade of *E* or *G* in at least 6 units, are required for the degree of Master of Forestry, under this program. Normally, 15 units of credit (including the thesis) must be earned in the School of Forestry.

Business Management Program. A specialized program is offered in the School of Forestry in cooperation with the Department of Economics and the Graduate School of Business Administration to prepare forestry graduates for managerial careers in the business aspects of industrial forest land management or forest products. The program requires two years of study and training leading to the degree of Master of Forestry. It is open to selected students who have earned a bachelor's degree (or the equivalent) in general forestry, forest manage-



ment, forest utilization, or wood science and technology, with the proper prerequisites, and who also have potential leadership qualities indicative of administrative and executive capacity.

The general requirements of the program are as follows:

1. At least 10 courses (30 units) in economics and business administration or in closely allied fields.
2. Approximately 5 courses (15 units) in forestry which deal with principles of administration and decision-making.
3. Experience as a paid managerial trainee with a cooperating firm for a period including the fall semester of the second year and the preceding summer.
4. A written analysis of some phase of the managerial operation of the organization with which the training period is spent.

A specific program of study, commensurate with each student's academic background and future goals, will be developed by the program advisory committee in consultation with the student. A sample list of suggested courses included in such a program of study is available upon request.

Students entering the program must meet the admission requirements of the School of Forestry and be approved by a committee representing the faculties of Economics and Forestry. The financial award benefits of the School of Forestry are available to applicants for this program (see pages 39-40). Application forms for admission and financial aid may be obtained from the director of admissions of the School of Forestry upon request.

Forest Protection Program. A combined program of specialization in entomology-pathology is available for students desiring career preparation in the applied aspects of forest insect and disease control. This program of study leads to

the Master of Forestry degree. Students electing the program must hold either a bachelor's degree in general forestry or have equivalent preparation in the biological sciences.

The general requirements of the program are as follows:

1. A minimum of 28 units in forest entomology and forest pathology. With approval, credits in closely related disciplines may be substituted.
2. At least 12 units of courses and seminars dealing with managerial and statistical aspects of forest protection.
3. One summer of employment experience with a forest protection agency.
4. Organization, conduct, and report of applied research on a forest insect and/or disease problems (4 units).

Reasonable latitude will be permitted in selecting courses to accommodate specific needs and interests. Each program of study will be developed in consultation with the program directors. A list of recommended courses is available upon request.

Applicants for this program must meet the requirements of the School of Forestry and the approval of the program advisory committee. Application forms for admission and financial aid may be obtained from the director of admissions of the School of Forestry.

Natural Resource Ecology and Environmental Management Program. A professional program is offered to students with career interests in the expanding fields of environmental management and protection. The basic objective of this program is to develop expertise in planning and administering the management of natural resources and the non-urban environment for maximum human benefits with minimum deterioration of ecosystem stability. Emphasis is placed on the ecosystem as the basic unit of natural resource management.

This program of study leads to the Master of Forestry degree and is open to students with a bachelor's degree in biological or environmental science or with training in other fields but strong motivation toward an ecological approach to natural resource problems.

General requirements of the program are:

1. A minimum of 24 units in resource ecology and environmental science.
2. At least 9 units of courses dealing with statistical or mathematical analysis of natural resource problems.
3. A minimum of 15 units of courses in resource use planning, business, and public administration.
4. Formulation, analysis, and report of research on an applied problem related to ecological or environmental aspects of natural resource management.

Although all students are expected to have substantive knowledge of principles of resource ecology, environmental science, and quantitative analysis, reasonable latitude is permitted in electing courses to meet the interests and capabilities of individual students. Each program of study will be developed in consultation with the program directors.

Application forms for admission and financial aid may be obtained from the director of admissions of the School of Forestry.

Program in Tropical Forestry. Fellowships are available for travel and subsistence in field-oriented programs in Central America. Refer to the section Organi-

zation for Tropical Studies in the *Graduate School Bulletin* in the chapter Special and Cooperative Programs.

Master of Science Degree

Prerequisites. The degree of Master of Science (M.S.) is offered through the Department of Forestry in the Graduate School. As a prerequisite to this degree a student must have earned a baccalaureate degree from an accredited college or university. There is no foreign language requirement for this degree.

Major and Minor Subjects. The work for the Master of Science degree is designed to provide a basic foundation in a fundamental area of forestry or in a field closely allied with forestry. A minimum of 30 units of credit is required for the degree; 24 units must be in formal courses although not more than 6 units can be earned for the thesis. Specific course requirements call for a minimum of 12 units in a major field of specialization and 6 units in a minor area of concentration. The major and minor fields are determined without regard to departmental divisions of the University, if the interdisciplinary nature of the area of specialization makes such a program of study advisable. The specific program of study is developed by the major professor (thesis supervisor), subject to the approval of the director of graduate studies in forestry and the dean of the Graduate School.

The Thesis. At least one month before presenting the thesis, that is on or before February 1 for a May degree or on or before August 1 for a September degree, the student must file with the dean of the Graduate School, on the official form, the title of the thesis and the declaration of intention to graduate. The title must have the approval of the thesis supervisor and the director of graduate studies in the major department. If the student has met the degree requirements before the above deadlines, he must file his intention to graduate one month before the thesis is presented.

All basic requirements for preparing the thesis are described in the *Manual of Style for Theses and Dissertations*, revised 1961, obtainable at the Duke University Book Store, West Campus. The quality of paper, form, and binding are prescribed in the *Manual*.

Four typewritten copies of the thesis, bound in snap binders supplied by the Library, must be submitted through the Graduate School Office to the dean of the Graduate School on or before April 15 for a May degree or on or before August 15 for a September degree, and at least one week before the scheduled date of the student's examination. The copies will then be distributed by the student to the several members of the examining committee. Three copies for the Library will be bound by the Ruzicka Bindery for a fee of \$5.00 a volume. The student may request that an additional number of copies be so bound.

The Examining Committee and the Examination. The instructor who directs the student's program appoints an examining committee composed of himself and two other members of the graduate faculty, one of whom must be from a department other than that of the major. If the student has been permitted to take related work within the major department, the third member may represent the minor field within the department. This committee is submitted for approval to the dean of the Graduate School at least one week preceding the final examination.

The student's committee administers the examination and certifies whether the student has passed or failed by signing the card provided for this purpose by



the Graduate School Office. This card is used to indicate completion of all requirements for the degree. After a thesis is approved the committee also signs all copies of the thesis, and the candidate then returns the original, the first two carbon copies, and any other copies he wishes bound by Ruzicka to the dean of the Graduate School who deposits them in the University Library.

Master of Arts Degree

The degree of Master of Arts (A.M.) is offered through the Department of Forestry in the Graduate School. As a prerequisite to admission for this program, a student must have earned a baccalaureate degree from an accredited college or university. Students interested in working toward this degree should refer to the *Bulletin of the Graduate School* for specific requirements.

Doctor of Forestry Degree

The degree of Doctor of Forestry (D.F.) is a professional and research degree conferred upon those students who have satisfactorily completed specified requirements of advanced study and research.

Work toward the D. F. degree, consisting of advanced studies in a major and a minor field, is offered with majors in the several branches of forestry. A minor may be elected in forestry or in other areas of specialized study in the University approved by the faculty of the School of Forestry. Prospective students should correspond with the director of admissions of the School of Forestry on all matters pertaining to admission to the School.

Doctor of Philosophy Degree

The Doctor of Philosophy degree (Ph.D.) is conferred through the Graduate School of Duke University. Programs of study and research for men and women working for this degree are directed by faculty members of the School of Forestry who also comprise the graduate faculty of the Department of Forestry in the Graduate School. Both major and minor programs of study are available in the following branches of forestry: forest biochemistry, forest biometry, forest meteorology, forest ecology, forest economics, forest entomology, forest hydrology, forest pathology, forest soils, forest-tree physiology, and wood science including wood anatomy, timber physics, and wood chemistry.

The Ph.D. degree is essentially a research degree. Although course work is a necessary part of the student's program, the mere accumulation of course credits will not be sufficient for attaining this degree. The granting of the Ph.D. is based primarily upon the student's knowledge of a specialized field of study and upon the production of an acceptable dissertation embodying the results of original research.

General Requirements for the D.F. and Ph.D. Degrees

The formal requirements, discussed in detail below, for the doctoral degrees are as follows: (1) foreign language; (2) major and minor courses; (3) supervisory committee for program of study; (4) residence; (5) preliminary examination; (6) dissertation; and (7) final examination. In order to be considered for candidacy for a doctoral degree, the student must have passed all of his course work in the first year of graduate study; on at least 9 units of course work in the first year, he must have made a grade of *G* or better.

Foreign Language Requirements. A reading knowledge of at least one foreign language is required for the D.F. and Ph.D. degrees. Languages normally taken are French, German, and Russian. Another language which has a definite relation to the degree program and for which an examination can be provided may be substituted for any of these with the approval of the supervisory committee.

A foreign student whose native language is not English may request that the director of graduate studies ask permission of the dean of the Graduate School to offer English as the foreign language required in his program.

With the special approval of the dean and of the Executive Committee of the Graduate Faculty, the foreign language requirement for the Ph.D. may be waived in individual cases provided the department submits satisfactory evidence that a foreign language has little bearing on the major program of the student concerned.

The foreign language requirement(s) may be satisfied in the following ways:

1. The student may take the Educational Testing Service examinations at many national centers (including the Duke University Counseling Center). To avoid delays, prospective students are urged to take appropriate ETS Graduate School Foreign Language tests prior to registration. However, it should be noted that at the time of the final examination in a master's program or of the preliminary examination in a doctoral program, language certificates more than six calendar years old will not be accepted toward fulfilling the language requirement.

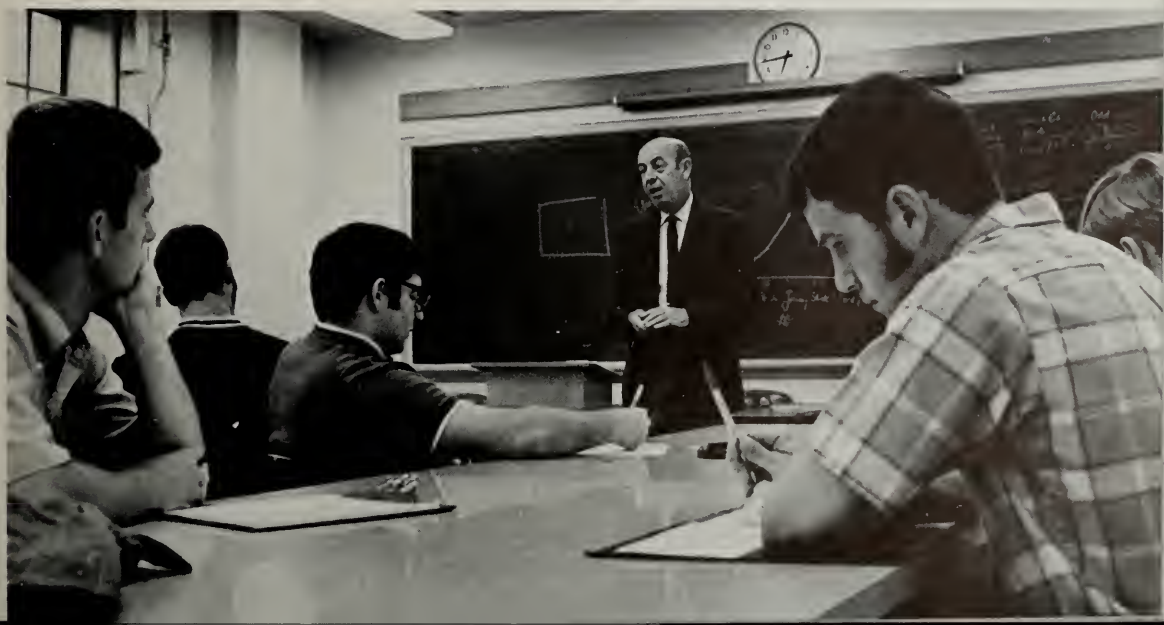
2. In a language for which ETS tests are not available, a reading examination may be arranged by the Graduate School Office and administered by a qualified examiner.

Special Reading Courses. Special courses designed to assist graduate students in acquiring a reading knowledge of French or German are offered for three hours a week. French is offered during the fall semester and occasionally also in the spring and German during the spring semester and the Summer Session. A student who registers for either course must reduce his normal load of graduate courses by 3 units, with no reduction in fees. No auditors are permitted in these courses at any time. Undergraduates may not enroll during the academic year but may register, with permission of the dean of the Graduate School, in the Summer Session if total registration permits.

Major and Minor. The student's program of study necessarily demands substantial concentration on courses in his major department. It must, however, include a minimum of 6 units in a minor subject or related fields approved by his major department. Use of related fields within the major department requires the approval of the dean.

Committee to Supervise the Program of Study. As early in a student's course of study as is practicable and *not later than two months before the preliminary examination*, the director of graduate studies in the major department will nominate for the approval of the dean a supervising committee of five, with one member designated as chairman. This committee will include at least three members of the major department and one from the minor department, if a minor is involved. This committee will approve the program of study, as well as administer the preliminary examination and the final doctoral examination. Should all members of the committee be from the major department, at least one member of another department will be added or substituted for the final doctoral examination. The final examination may be administered with a minimum of four members.

When the preliminary examination is arranged, the committee and the director will submit to the dean the student's program of study bearing a statement that the department's course and language requirements have been, or are being, completed.



Residence. The *minimum* registration requirement is 60 units of graduate credit, not more than 30 units of which may be accepted by transfer. Since a full program is 30 units per academic year, the prospective doctoral candidate who enters with an A.B. or B.S. degree must plan to spend in residence a *minimum* of two academic years; if he enters with an A.M., M.S., or M.F. degree, his *minimum* residence is one academic year. If there are undergraduate deficiencies in his program, he may, in addition to the minimum requirements, be required to take preliminary undergraduate courses for which he will not receive graduate credit. Even if there are no such undergraduate deficiencies, the student's supervisory committee will determine what requirements, if any, above the minimum the student must meet. See pages 23-24 for further information on registration in residence and *in absentia*.

When the preliminary examination is passed, any courses, language certifications, or other credits for advanced standing which are more than six calendar years old will not be accepted toward fulfilling the minimum requirements of the doctoral degree.

The student should normally pass the preliminary examination by the end of his second year of graduate study. If he has not passed it by the middle of the third year, he must file with the dean a statement explaining the delay and setting a date for the examination. Except under unusual circumstances, extension will not be granted beyond the end of the third year.

The doctoral dissertation should be submitted and accepted within two calendar years after the preliminary examination is passed. Should the dissertation not be submitted and accepted within four years after the examination, the candidate, with the approval of his committee, may petition the dean for an extension of one year. Should this extension be granted and the dissertation not be submitted and accepted within the year, the student must pass a second preliminary examination to remain a doctoral degree candidate. In such a case, the time limit for submitting the dissertation will be determined by the dean and the candidate's committee.

Preliminary Examination. A student is not accepted as a candidate for the doctoral degree until he has passed the preliminary examination. A transfer student who may have passed a preliminary examination elsewhere must, nevertheless, take the examination at Duke. The examination ordinarily covers both the major and minor fields.

In the summer, a preliminary examination may be scheduled only between the opening and closing dates of the summer session.

Should the student fail the preliminary examination, he may apply, with the consent of his supervisory committee and the dean, for the privilege of a second examination to be taken no sooner than three months after the date of the first. Failure on the second examination will render the student ineligible to continue his program for the doctoral degree at Duke University.

The Dissertation. The dissertation is expected to be a mature and competent piece of writing, embodying the results of significant and original research.

Not later than February 1 (February 2 if February 1 falls on Sunday) preceding the May commencement at which the degree is expected to be conferred, the student must file with the dean of the appropriate school, on the official form to be obtained from the Graduate School Office, the title of the dissertation. This title must receive the written approval of both the director of graduate studies of the student's major department and the professor who directs the dissertation.

The basic requirements for preparing the dissertation such as quality of paper, form, and binding are prescribed in the instructions for microfilming (see below) and in the *Manual of Style for Theses and Dissertations*, revised 1961, which may be obtained from the Duke University Book Store, West Campus.

The dissertation must be completed to the satisfaction of the instructor who directs it. Four typewritten copies bound in snap binders secured through the Graduate School Office must be deposited with the dean of the appropriate school on or before April 1 preceding the May commencement when the degree is to be conferred. The dissertation must be submitted at least seven days before the scheduled date of the student's examination.

All doctoral dissertations will normally be published on microfilm through University Microfilms, Ann Arbor, Michigan. Authors may, if they wish, also copyright them. An abstract will be published in *Dissertation Abstracts*. Before final typing is completed, the candidate should obtain, in the Graduate School Office, detailed instructions on the procedure, together with a microfilming agreement which is signed and returned when the dissertation is finally deposited in the Graduate School Office.

In brief, all copies of the dissertation, the original in clean type, will remain unbound except for spring binders. Ten copies of an abstract, carefully written and not more than 600 words long, are submitted when the dissertation is first presented. A non-returnable dissertation fee of \$25 is charged for handling and microfilming. If copyright is desired, an additional fee of \$7 plus 2½ cents per page is charged. The original and two carbon copies will be bound by the Ruzicka Bindery for a fee of \$5.00 a volume. The student may request that more than the three copies be so bound.

Final Examination. The final oral examination shall be based primarily upon the dissertation. Questions may, however, be asked in the candidate's major field. Except in unusual circumstances, approved by the dean, a final examination will only be scheduled when school is in session.

If a student fails his final examination, he may be allowed to take it for a second time, but not sooner than six months from the date of his first. Permission to take the second examination must be obtained from the instructor who directed the dissertation and from the dean. Failure to pass the second examination renders the student ineligible to continue work for the doctoral degree at Duke University.



Cooperative Plan of Study

Program with Selected Colleges and Universities

Since its inception the Duke School of Forestry has had the cooperation of Trinity College (the men's undergraduate college of arts and sciences of Duke University) in preparing students for professional careers in forestry. Under the plan, a student devotes his first three years to a coordinated and carefully integrated program of study in the basic arts and sciences in Trinity College. The following five semesters are spent in the School of Forestry. Upon the successful completion of this five and one-half year course of study, a student will have earned the Bachelor of Science degree from Trinity College and the professional Master of Forestry degree from the Duke School of Forestry.

Based upon the experience and success of this cooperative program with Trinity College, the School of Forestry in 1952 initiated similar programs of collaboration with a selected group of colleges and universities located throughout the United States. These programs offer students the numerous advantages of a broad background in liberal arts and sciences as preparation for later professional training. A student intent upon following such a course of study should make application to one of the colleges listed on pages 16-17. Admission requirements and other information pertinent to matriculation may be obtained from each of these institutions. Not later than the end of the first semester of the third year in the college or university of his choice, the student may take formal application for admission to the Duke University School of Forestry. To qualify for admission under these programs, a student must have followed a course of study arranged in consultation with his adviser, must have the official recommendation of his college, and must meet the minimum requirements for admission to the Duke School of Forestry.

Institutions in the Academic-Forestry Program

Alabama

Samford University Birmingham 35209

Arkansas

Little Rock University Little Rock 72204

Colorado

Colorado College Colorado Springs 80903

Florida

Florida Southern College Lakeland 33802

Rollins College Winter Park 32791

Stetson University, College of Liberal Arts DeLand 32720

Georgia

Mercer University Macon 31207

Illinois

Illinois Wesleyan University, College of Liberal Arts Bloomington 61710

Indiana

Butler University, College of Liberal Arts and Sciences Indianapolis

Indiana Central College Indianapolis 46227

Iowa

Iowa Wesleyan College Mount Pleasant 52641

Kansas

Baker University Baldwin 66006

Louisiana

Centenary College of Louisiana Shreveport 71104

Maryland

Western Maryland College Westminster 21158

Michigan

Albion College Albion 49224

Mississippi

Millsaps College Jackson 39210

Missouri

William Jewell College Liberty 64068

Nebraska

Doane College Crete 68333

New Jersey

Drew University, College of Liberal Arts Madison 07940

New York

Hofstra University Hempstead, Long Island 11550

North Carolina

Catawba College Salisbury 28114

Duke University, Trinity College Durham 27706

Guilford College Guilford College 27410

High Point College High Point 27262

Wake Forest University Winston-Salem 27106

Ohio

Baldwin-Wallace College Berea 44017
Denison University Granville 43023
Heidelberg College Tiffin 44883
Kent State University, College of Liberal Arts Kent 44240
Marietta College Marietta 45750
Miami University, College of Arts and Sciences Oxford 45056
Ohio University Athens 45701
Otterbein College Westerville 43081
Wittenberg University Springfield 45501
Youngstown State University Youngstown 44503

Oregon

Reed College Portland 97202
Willamette University, College of Liberal Arts Salem 97301

Pennsylvania

Albright College Reading 19604
Elizabethtown College Elizabethtown 17022
Franklin and Marshall College Lancaster 17603
Gettysburg College Gettysburg 17325
Juniata College Huntingdon 16653
Lebanon Valley College Annville 17003
Lycoming College Williamsport 17704
Moravian College Bethlehem 18018
Muhlenberg College Allentown 18104
Thiel College Greenville 16125

South Carolina

Furman University Greenville 29613
Newberry College Newberry 29108

Tennessee

Carson-Newman College Jefferson City 37760
Chattanooga, University of, College of Liberal Arts Chattanooga 37403
East Tennessee State University Johnson City 37602
Lincoln Memorial University Harrogate 37752
Tennessee Wesleyan College Athens 37303
Tusculum College Greenville 37743

Texas

Baylor University, College of Arts and Sciences Waco 76706

Virginia

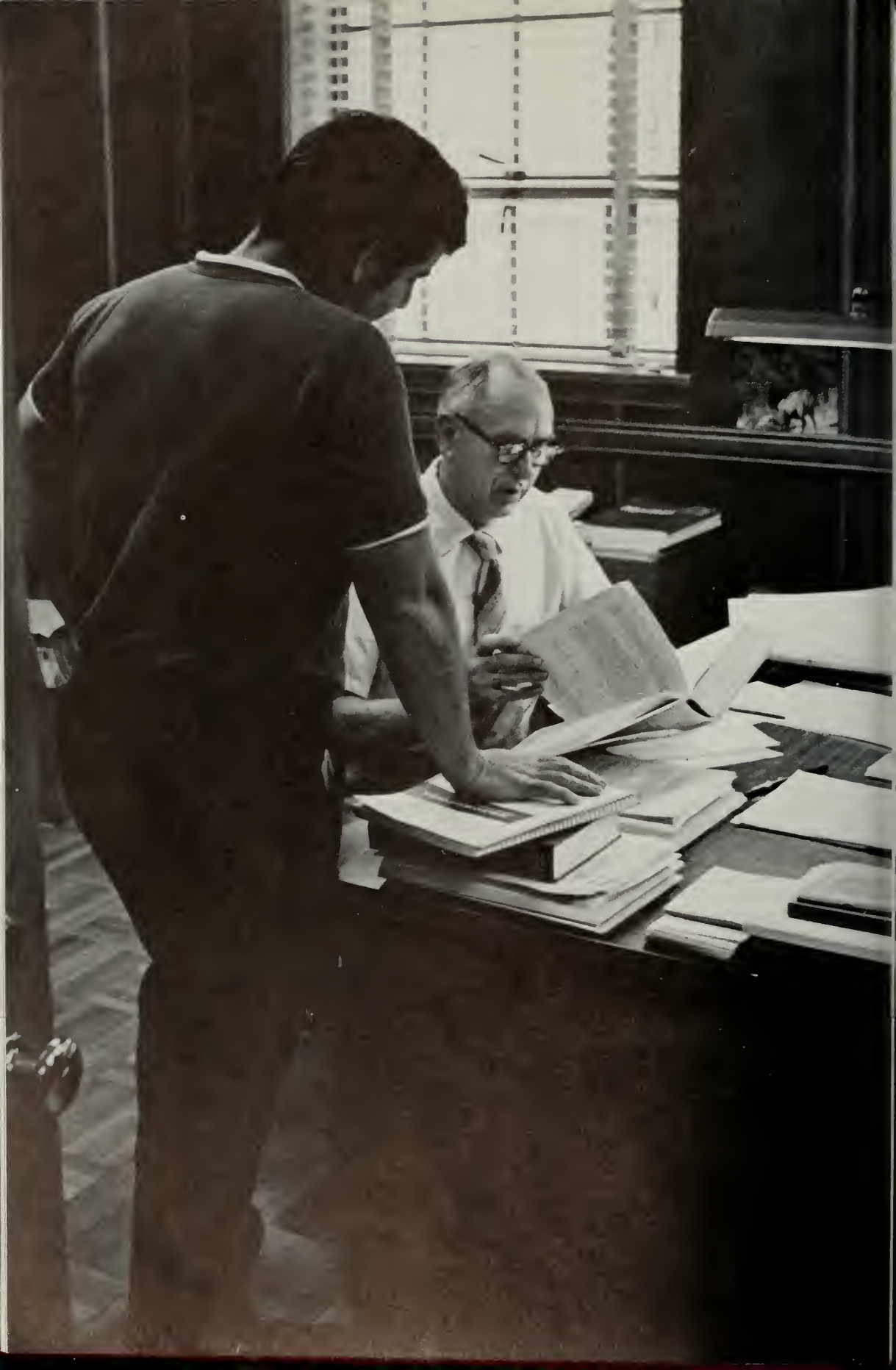
Bridgewater College Bridgewater 22812
Randolph-Macon College Ashland 23005
Richmond, University of, Richmond College Richmond 23173
William and Mary, College of Williamsburg 23185

West Virginia

Davis and Elkins College Elkins 26241
Marshall University Huntington 25701
West Virginia Wesleyan College Buckhannon 26201

Wisconsin

Beloit College Beloit 53512



4

Admission

Master of Forestry Degree

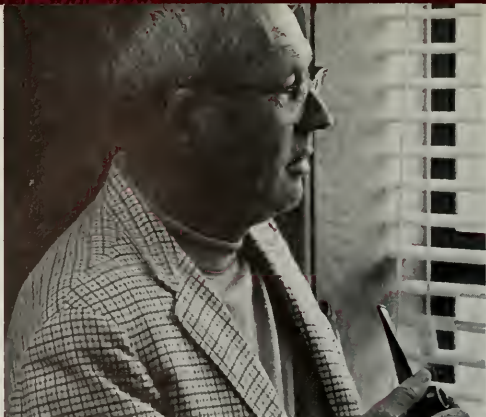
The admission requirements of the School of Forestry for work toward the Master of Forestry degree presuppose that an applicant is either:

1. a graduate of a professional school of forestry, or
2. a graduate of a college or university of high standing, but without prior professional training in forestry, or
3. a student who has successfully completed three years of approved study at one of the colleges (listed on pages 16-17) cooperating with the School in the academic-forestry program.

Each applicant must present a certified transcript of his academic record showing the courses he has taken, the number of credit hours earned, and the grades received. Although specific courses are not required for admission, applicants must be aware that many fields within forestry require academic preparation of a specialized nature. Deficiencies, if any, may be satisfied in residence, possibly prolonging the time necessary to complete degree requirements. Students interested in specialized areas of forestry should write the dean for advice as to specific preparatory courses.

An applicant who is a graduate of a professional school of forestry will present a certified transcript of his scholastic record. Before registering for the first semester of residence students will be required to select the branch or branches of forestry in which they wish to concentrate the major part of their work and to prepare their proposed programs in conference with an appropriate faculty advisory committee. Ordinarily, graduates of a fully accredited school of forestry should be able to meet all requirements for the Master of Forestry degree in one full school year of resident study; others may require a longer period of residence.

Professor Charles Ralston,
Dean of the School of Forestry



Doctor of Forestry Degree

Admission to the School of Forestry for a program of study and research leading to the Doctor of Forestry degree is granted to a student who has received the Master of Forestry degree, or its equivalent.

An applicant must file a formal application for admission together with transcripts of his undergraduate and graduate academic records. In his application he should clearly state the branch of forestry in which he desires to concentrate, and if possible, his specific research interests.

The director of admissions of the School of Forestry, together with the prospective student's major adviser, will determine if the qualifications of the applicant meet entrance requirements.

Master of Science and Doctor of Philosophy Degrees

Applications for admission into M.S. and Ph.D. programs in Forestry should be submitted to the director of admissions, Duke School of Forestry, for transmittal to the Office of the Dean of the Graduate School.

A student seeking admission to the Graduate School of Duke University must have received an A.B. or B.S. degree (or the equivalent in the case of foreign students) from an accredited institution. His undergraduate program should be well rounded and of such quality as to give positive evidence of the capacity for graduate study.

Applicants for all degree programs of the School of Forestry will be considered for admission without regard to race, color, religion, sex, or national origin.

Cross section of the Longleaf Pine (*Pinus palustris*)





5

Registration and Regulations

Registration

All students who enter course work or residence for credit; all students who have completed minimum requirements for an advanced degree, but continue to use the facilities of the University in their research; all students in *in absentia* status; and all students who wish merely to audit a course or courses must register.

After the applicant has received notification of his admission to the School of Forestry and has returned his statement of acceptance of admission, he may present himself for registration. During the registration periods, announced in this *Bulletin*, he first confers with an assigned faculty adviser who prepares and signs a course card, listing the course work to be taken during the semester. The student then presents this course card to registration officials, who enroll him officially in his courses. After his first registration period as a current student he will pre-register at the stated times for preregistration. Failure to preregister incurs the penalty for late registration. Former students who intend to register to resume a degree program must give the director of admissions notice of this intention two months before registration. A period of five weeks from the date of registration is provided for changes resulting from passing a preliminary examination.

Late Registration. All students are expected to register or preregister at the times stated in this *Bulletin*. Those registering late, including those who are obliged to register *in absentia*, are subject to a late registration fee of \$10.00.

Change of Registration. During the academic year within a period of fourteen days from the registration date, a student may change registration with the approval of his adviser, if no reduction of fee is involved, and with the approval

of the dean if a reduction of fee is involved. During the first thirty days from the registration date the only permissible change is dropping course-seminar registration and adding equivalent units of research, with the approval of his adviser, the instructor of the course, and the dean.

Normal Registration. A graduate student is designated as fully registered when he registers for the maximum credit his program requires. Required registration is set in consideration of the student's obligation to teach or assist and the stage he has reached in completion of degree requirements. In the academic year normal registration for the resident student who does not hold an appointment as part-time instructor or assistant, or does not engage in part-time work, is 15 units a semester or 30 units an academic year. The normal registration for the student who holds such an appointment or undertakes such work is either 12 units or a minimum of 9 units, depending upon the number of hours a week he is required to devote to such duties.

The resident student in a terminal master's program which requires no thesis carries normal registration until he has met all degree requirements. If a thesis is required and the student has met all requirements except for submitting his thesis, he registers for 3 units a semester while in residence or, if he elects to go out of residence, for 1 unit *in absentia* each semester until the thesis is accepted.

The resident student engaged in a master's program which is not terminal but preparatory to a doctoral program registers as though he were a doctoral student.

The resident student in a doctoral program carries normal registration through the semester in which he passes the preliminary examination. If he remains in residence, he continues to register for a minimum of 3 units a semester until the dissertation is accepted. If, before or after passing the preliminary examination, he elects to go out of residence, he registers for 1 unit a semester *in absentia* in order to keep his program active.

It is necessary to be a fully registered student according to the regulations listed above (except when registered *in absentia*) in order to establish eligibility for library carrel and laboratory space, for student housing, for University and some outside loans, for the Student Health service including voluntary insurance coverage, and for reporting status for military duty.

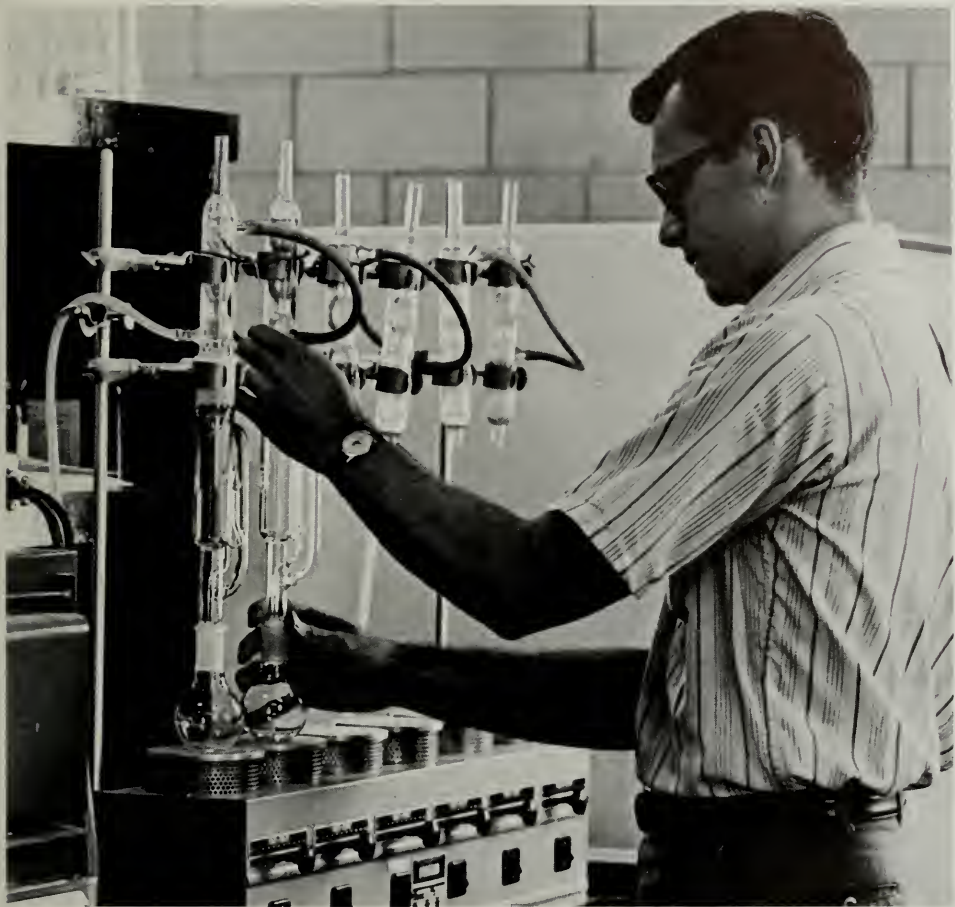
The registration of 1 unit a semester *in absentia* provides occasional consultation with the thesis or dissertation supervisor. It may be waived for military duty or serious problems of health.

In the *Summer Session* 6 units a term is maximum registration. Students who are residents in the academic year and wish to continue study and the use of University facilities including Summer Session Student Health during the summer must register for 1 unit in the first Summer Session term. This registration provides use of these facilities for both terms.

Academic Regulations

Transfer of Graduate Credits. Credit for graduate course work earned at another institution will be determined only after a student has spent one semester at Duke University. After completing his first semester, the student, through his director of graduate studies, should file a request that his credits be reviewed and a decision be made.

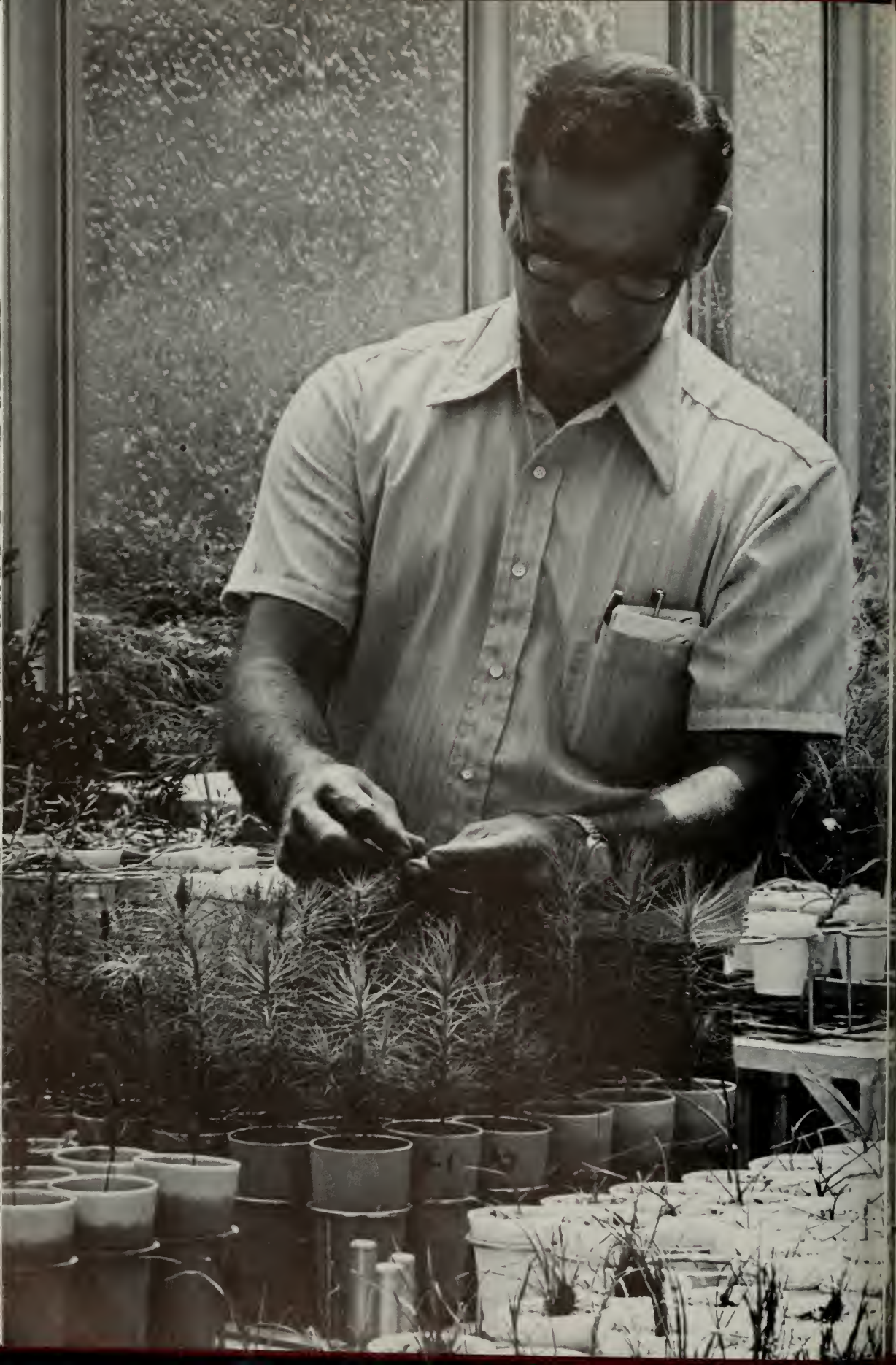
Grades. Grades in the School of Forestry are as follows: *E* (exceptional); *G* (good); *S* (satisfactory); *F* (failing); and *I* (incomplete).



An *I* (incomplete) indicates that some portion of the student's work is lacking, for an acceptable reason, at the time grades are reported. The instructor who gives an *I* for a course specifies the date at which the student must make up the deficiency, in no case more than one calendar year from the date the course ended. If the course is not completed, the grade of *F* is entered upon the student's record unless his appeal to the dean for the grade *No Credit* is approved.

A grade of *F* in any course normally occasions withdrawal from a degree program.

Reciprocal Agreements with the Consolidated University of North Carolina and North Carolina Central University. Under a plan of cooperation between the Consolidated University of North Carolina and Duke University, students regularly enrolled in the Graduate Schools of the University of North Carolina during the regular academic year, and paying full fees to that institution, may be admitted to a maximum of two courses per semester in the Graduate School of Duke University upon payment of a nominal registration fee of two dollars and of any other special fees regularly required of all students. Under the same arrangements, students in Forestry and the Graduate Schools of Duke University may be admitted to course work at the University of North Carolina and North Carolina State University. A similar arrangement exists with North Carolina Central University at Durham.



6

Resources for Study

General and Research Facilities

The School of Forestry is housed in the south wing of the Biological Sciences Building on the West Campus. General and research laboratories are provided for routine and original studies in all of the subject matter fields. These laboratories are equipped with instruments and facilities for quantitative evaluation of biological materials and processes. Greenhouses and the phytotron immediately adjacent to the Biological Sciences Building and the nearby Duke Forest offer excellent facilities for biological investigations in controlled and natural environments. An IBM system 370 Model 165 Digital Computer is available for processing research data via a teletype terminal at the School.

Facilities of allied departments of the University are also available for advanced work in chemistry, economics, genetics, mathematics, plant anatomy, plant ecology, plant pathology, and plant physiology.

West Virginia Pulp and Paper Company has made available to Duke University a field headquarters for work in the forests of the South Atlantic Coastal Plain. This camp, located eighteen miles northwest of Summerville, South Carolina, is used as a base for field instruction in timber harvesting, wood utilization, soils, silviculture, and forest management.

The School periodically sponsors conferences and symposia on industrial forest management and other technical and scientific subjects. These offer the current viewpoints of many outstanding individuals in both forestry and in allied fields.

The University library, with 2,000,000 volumes and 4,000,000 manuscripts, provides exceptional resources and facilities for study and research by undergraduate and graduate students, and by visiting scholars. About 80,000 volumes are

added annually, and 164 foreign and domestic newspapers and 9,800 periodicals are received currently. Large collections of microfilms of rare books, newspapers, and periodicals are also available.

The Biology-Forestry library, Chemistry library, and Physics-Mathematics library are housed for convenience in the buildings of these departments. The libraries of the Schools of Divinity, Law, Medicine, and Engineering are also housed in the buildings of these schools, all on the West Campus. The Woman's College Library on East Campus includes another 171,000 volumes.

The Duke Forest. The Duke Forest, of approximately 8,000 acres, is particularly well situated for field work. A five-minute walk from the campus will take one well into many parts of the area, and even the most distant portions can be reached by automobile in about twenty minutes.

At few other places in America are there provisions for extensive field study and research in forestry literally at the door of a large university. This natural outdoor laboratory, so conveniently located and representative of the region, is a most valuable supplement to the instructional, laboratory, and library facilities of Duke University.

The forest lies mainly in Durham and Orange Counties near the eastern edge of the Piedmont Plateau. A crosssection of much of the woodlands in the upper coastal plain and lower Piedmont of the Southeast is represented in the forest with its variety of topography, soil, forest conditions, and patterns of past land use. Elevations range from 280 to 760 feet. The soils are derived from such diverse parent material as metamorphic rock of the Carolina slate formation, granite, Triassic sedimentary rock, and basic intrusives. Nearly one hundred tree species are represented. Some eighteen miles of improved woods roads make all parts of these woodlands readily accessible. It serves as an outdoor laboratory for instruction in forestry and allied fields, and as an experimental forest for research in problems of timber growing and in the sciences basic thereto. It is also used to demonstrate methods of silviculture and forest management applicable to the region.





Forestry Sciences Laboratory. The establishment of the Forestry Sciences Laboratory of the United States Forest Service's Southeastern Forest Experiment Station in the Research Triangle Park near Durham provides an unusual opportunity for complementing the research programs of students in the School of Forestry. Specialized research projects in forest entomology, pathology, and soils are currently under way at the laboratory. The research staff of the laboratory is available for consultation, participation in seminars, and service on graduate committees of students in the School of Forestry. Arrangements may also be made for students to conduct certain aspects of their research at the laboratory.

Phytotron. A controlled environment plant growth facility adjoins the Biological Sciences Building. The Duke phytotron contains fifty separately controlled environmental areas. In the chambers and greenhouses it is possible to dissect or reproduce any total environment in the world. Using this procedure, one can study the influence of many environmental factors on the growth processes of trees. The chambers accommodate trees up to six feet tall, the greenhouses even larger plants. The Duke phytotron is one of three such laboratories in the United States.



7

Student Life at Duke

Living Accommodations

Duke University provides residence hall accommodations for single graduate and professional men and residence hall and apartment accommodations for single graduate-level women. Since no married student housing facilities are available, the University provides assistance to married graduate and professional students in locating suitable housing in Durham where varied types of living units are reasonably available.

The Graduate Center houses men and women enrolled on a full-time basis in the Graduate School and the professional schools. Graduate women are also assigned to Hanes Annex, a residence hall, and to Town House Apartments located between East and West Campus.

The Graduate Center houses 197 male graduate students, 56 women graduate students, and 117 women undergraduates. Commons facilities on the main floor are shared by men and women.

Hanes Annex has 39 beds for graduate and allied health students. The second floor of this building is used by seniors in the School of Nursing. Commons areas are jointly used by the two groups.

Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specified term.

Duke University operates Town House Apartments primarily for graduate and professional women students. Others are housed in individual apartments if the interests of the University are served. There are 30 two-bedroom units, each furnished for three occupants. Two students occupy the master bedroom with an adjoining half-bath, and the third occupies a smaller bedroom. A living room, kitchen, and full bath complete the living arrangement. Additional features are

air-conditioning and a swimming pool. The campus bus which services all parts of the University is accessible to the Town House Apartments.

The Department of Housing Management is prepared to assist the married graduate and professional students in locating suitable housing in Durham. There are many relatively new complexes and a few older apartments. Houses and duplex units are available in limited numbers from time to time.

Detailed information about University housing facilities for single students, and the housing assistance program for married students, will be provided upon request by the Department of Housing Management, Duke University, Duke Station, Durham, North Carolina 27706.

Rooms in residence halls and spaces in Town House Apartments or other rental units may be reserved by applicants only if they have been accepted by the Graduate School, and after the required \$25 room or security deposit has been paid to the University. The initial room or security deposit is required with the application and is held until the room or apartment is vacated. Application forms and detailed information on graduate housing will be mailed when the Graduate School has notified the Department of Housing Management of official acceptance of the student. Single women may express a choice for the type of housing desired. Completed applications for rooms and apartments are to be returned, with required deposits, to the Department of Housing Management, Duke Station, Duke University, Durham, N. C. 27706. Assignment priority is established by the date of receipt of completed applications and deposits in this office.

Regulations governing occupancy of rooms and apartments will be provided by the Department of Housing Management at the time application forms are forwarded to accepted students. Occupants within each type of housing are expected to comply with the appropriate regulations.

For the cost of housing and for details on rental refund policy, see the section on Housing in the Financial Information chapter.

Dining Service. The dining facilities on the West Campus include two cafeterias with multiple-choice menus, a snack bar, and the Oak Room where full meals and *a la carte* items are served. In the Graduate Center there is a cafeteria with multiple-choice menus and a coffee lounge where sodas and sandwiches are served.

Due to the large number served in the dining halls, it is not possible to arrange special diets for individual students. Special diets for the sick are served in the infirmary.

Services Available

Medical Care. The complete medical facilities of the Duke University Medical Center are available to all members of the University community. To secure the benefits of the Student Health program, a graduate student during the terms or semester in which the illness occurs must (1) in the Summer Session term be registered for at least 1 unit research or 3 units of course work, (2) prior to completing minimum residence requirements, be registered for at least 9 units per semester. Students are not covered during vacations and their dependents and members of their family are not covered at any time. Care is provided for all students at the University Student Health Service at the Marshall I. Pickens Rehabilitation Center located on Erwin Road.

The service provided includes hospitalization in Duke Hospital, when recommended by the Hospital staff, to a limit of thirty days; medical and surgical



care under the supervision of a senior physician or surgeon; drugs; X-ray work; and ward nursing. Students pay for board while in the hospital. Excluded from the service are refraction of eyes, treatment of teeth and of all chronic and pre-existing conditions, and elective surgery.

Students are urged to carry adequate health insurance to supplement Student Health Program services. If students have insurance providing hospitalization, surgical, or medical benefits, these benefits shall be applied to the cost of their medical care. Foreign students are required to hold this or another acceptable policy.

The Duke University Counseling Center. Through the counseling center, the University provides a professional counseling service designed to aid students in gaining a better understanding of themselves and the opportunities available to them. Counseling is available in the areas of career planning, educational opportunities, and personal and social adjustment.

The center maintains files of educational and vocational information related to career planning, graduate educational programs and fellowships, and study aids.

National and University-wide testing programs are administered by the center. A continuing program of research in the areas of counseling and testing is also carried on by the staff of the center.

Office of Placement Services. Duke University maintains an Office of Placement Services which acts as a liaison between the University and potential employers in business, education, and government. All services are offered without charge to Duke students and alumni. The staff is available to talk with students about their future professional plans. Students who wish to register with the office are offered an opportunity to assemble a complete dossier of academic records and recommendations to supplement applications for positions and to have a permanent file for future reference. Pertinent recommendations are far easier to accumulate during the time a student is enrolled at Duke. Interviews with representatives visiting Duke are scheduled throughout the year through the Placement Office for those students who have registered. Copies of academic records are released only with the permission of the individual.

Student Activities

Forestry students new to Duke University are reminded that they are welcome to use such recreational facilities as swimming pools, tennis courts, golf course, and to affiliate with choral, instrumental, drama, and religious groups.

Students are encouraged to maintain broad professional contacts by participation in the activities of the Society of American Foresters, the Forest Products Research Society, the national honorary scientific society of Sigma Xi, and other societies appropriate to their major field of study.

The social and business events of the Forestry Club provide opportunities for many pleasant extracurricular activities. An active organization of the wives of forestry students, the Forestry Dames, offers a regular schedule for social occasions of interest to this group.

Conduct of Students

Duke University expects and will require of all its students continuing loyal

cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as are currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

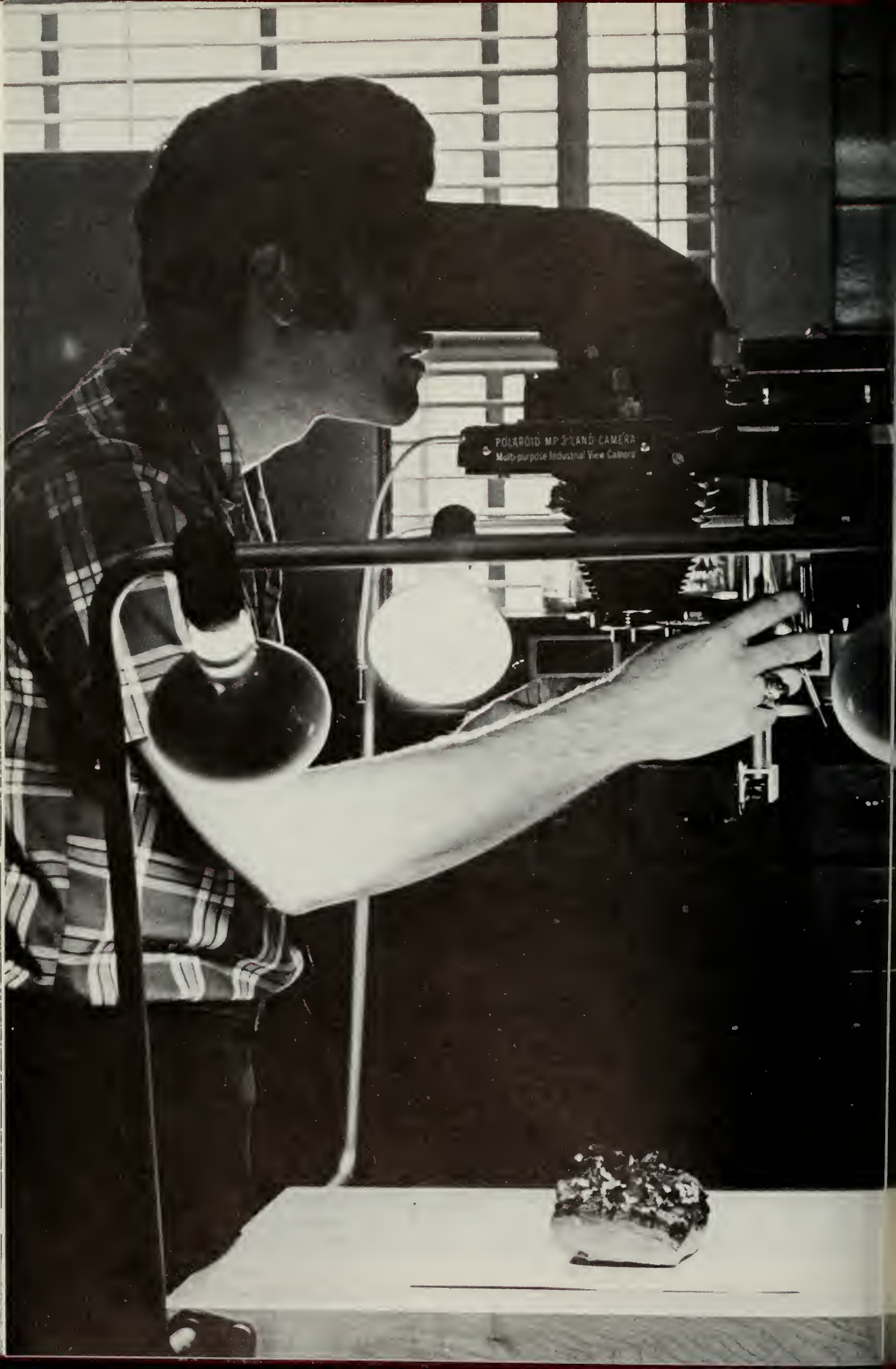
Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations, or for conduct adjudged unsatisfactory or detrimental to the University.

Visiting Scholars

The libraries and, to the extent practicable, other facilities of Duke University will be made available to faculty members of colleges and universities who wish to spend a period of time on the campus in pursuit of their scholarly interests. No fees will be charged such visitors unless they wish to participate in activities for which a special fee is assessed. Room and board may be arranged for at the regular rate in the dormitories and dining rooms. Dormitory space is usually available during the summer months. Inquiries concerning residence for visiting scholars should be directed to the dean of the Graduate School.

Installation of sensors for a study of the radiation balance of a pine plantation





8

Financial Information

Tuition and Fees*

The following table shows the charges collected from all students. All charges for each semester are due and payable, unless otherwise specified, at the time of registration and no student is admitted to classes until arrangements have been made with the Bursar of the University for the settlement of such charges. After the day of registration, no refund of tuition will be made except for involuntary withdrawal to enter the armed services.

Tuition, per semester	\$1050.00
Spring field seminars	\$ 10.00
<i>In Absentia</i> Fee, per semester (when applicable)	\$ 70.00

Forestry students may obtain admission to all regularly scheduled University athletic contests held on the University grounds during the entire academic year by payment of an athletic fee of \$25.00 per year, plus any federal taxes that may be imposed. This fee is payable in the fall semester.

Audit Fee. If a student registers and pays fees for 12 units or more, he may audit one course without charge. Should he be permitted to audit a second course or should he be registered for less than 12 units the audit fee is \$35.00 per course.

Transcripts. A student may request transcripts of his academic record. A minimum fee of one dollar, payable in advance, is charged for a single copy. A charge of \$.50 will be made for each additional copy of the same order.

*Although these fees are based upon existing charges, they are subject to change.

Debts. No records are released and no student is considered by the faculty as a candidate for a degree until he has settled with the Bursar for all indebtedness.

Living Accommodations

Housing. Rooms in the Graduate Center are equipped for two persons. The rental charge for a double room is \$650.00 for the academic year, or \$325.00 for each occupant, or \$162.50 per occupant for each semester. Rooms are rented for the academic year, but for no period of less than one semester.

All requests for rates and other information for apartment-type accommodations should be addressed to the Director of Housing Management, Duke University. Specific information will be supplied as available.

Housing for women students in the graduate women's facilities is available at comparable rates.

No refund or room rent will be made except for involuntary withdrawal to enter the armed services. Such refunds will be made in accordance with the University's established schedules.

Dining Service. The cost of the dining facilities discussed on page 32 will approximate \$600.00, depending on the tastes of the individual.

Motor Vehicles

Each student possessing or maintaining a motor vehicle at Duke University shall register it annually at the beginning of the fall semester. If a student acquires a motor vehicle and maintains it at Duke University after enrollment, he must immediately register it. At the time of registration of a motor vehicle, the following documents must be presented:

- a. State vehicle registration certificate.
- b. Valid driver's license.
- c. Satisfactory evidence of automobile liability insurance coverage with limits of at least \$10,000 per person and \$20,000 per accident for personal injur-



ies, and \$5,000 for property damage, as required by the North Carolina Motor Vehicle Law.

d. If the student is under 21, a statement signed by the student's parent or guardian granting the student permission to operate a motor vehicle at Duke University.

There is a registration fee of \$30.00 per year for each automobile operated on the campus by students who live on the campus. There is a similar fee of \$10.00 for the registration of two-wheeled motor vehicles.

Estimated Expenses for the Academic Year

The following table represents an estimate of a graduate student's basic expenses in the School of Forestry for one year. It should be noted, however, that this estimate does not include any allowance for travel, clothing, and other miscellaneous expenses, inasmuch as these costs will vary depending on the needs, habits, and tastes of the individual.

	<i>Low</i>	<i>Moderate</i>	<i>Liberal</i>
Tuition	\$2100.00	\$2100.00	\$2100.00
Room-rent*	325.00	325.00	420.00
Board	550.00	600.00	650.00
Laundry	30.00	40.00	50.00
Books	50.00	65.00	100.00
Athletic Fee (Optional)	25.00	25.00	25.00
Spring field seminars	10.00	10.00	10.00

*In the Graduate Center.

Student Aid

A number of fellowships, scholarships, and assistantships are allocated to the School of Forestry for the encouragement and financial assistance of men and women who offer promise of becoming leaders in the forestry profession. These are awarded to applicants of high character on the basis of scholastic ability as judged by previous educational performance, professional experience, personal references, and the Graduate Record Examination. Holders of the awards will pay tuition and such additional fees as are regularly required.

Fellowships. Stipends range from \$2,300-\$4,000 per academic year. Each recipient must have previously completed work equivalent to that required at Duke University for a master's degree with a major in forestry or in a discipline basic to forestry. He will devote his time to an approved program of study and research in any of the branches of forestry. He is expected to become a candidate for the degree of Doctor of Forestry or Doctor of Philosophy.

Scholarships. Stipends range from \$1,900-\$3,200 per academic year. Each recipient will normally devote his time to an approved program of study leading to the degree of Master of Forestry, or Master of Science with a major in forestry.

Graduate Assistantships. Graduate assistantships have variable stipends up to \$4,000, depending upon available funds and upon whether granted for the academic year only, or the academic year plus the summer. Each recipient will devote half-time to research or other work of the School of Forestry. He will be permitted to enroll for not more than 24 units in an academic year in an approved program of study, or study and research.

Application for Awards. Any student admitted to the School of Forestry is eligible to apply for a fellowship, a scholarship, or an assistantship. Application for these awards may be made concurrently with the application for admission.

The general procedures and requirements for applying for any financial award in the School of Forestry are outlined below. Applicants should initiate the necessary action early to ensure that the required documents are filed with the dean of the School of Forestry on or before March 1 prior to enrollment.

1. File award application. Form will be supplied by the School of Forestry upon request.

2. Furnish supporting documents as follows: (a) official transcripts of record of all previous college or university credits earned and (b) letters of reference from at least three persons familiar with the applicant's character, scholarship, and professional ability. (Documents offered in support of admission, if so designated, may also serve in support of the application for financial award.)

3. Complete the Aptitude Test of the Graduate Record Examination. Instructions and application for admission to this locally administered examination are available on most college campuses, from the Duke School of Forestry, or by writing the Educational Testing Service, Princeton, New Jersey. Applicants should plan to take this examination in January or earlier.

Notification of awards is made on April 1. In case vacancies occur, completed applications received after March 1 will be considered at a later date.

In every instance where a graduate assistantship, scholarship, or fellowship for the next academic year is offered to an actual or prospective graduate student and accepted before April 15, the recipient may resign his appointment without prejudice prior to that date by notification in writing to the dean. However, an acceptance given or left in force after April 15 obligates him not to accept another appointment without first obtaining formal release from the dean of the School.

Loans

Students who are enrolled as full-time degree candidates and who have satisfactory academic and citizenship records are eligible to apply for student loans.

Champion Paper Foundation Fund. Established in 1971 by a grant of the Champion Paper Foundation in support of the School of Forestry. Forestry students may apply for assistance from this fund through the University Student Loan Office.

University Student Loans. Loans from University funds generally mature after borrowers have left the University. Interest accrues on long-term loans from University funds at the rate of 1 percent per annum from the date of each note. After a student has left the University permanently, the loans begin accruing interest at the rate of 3 percent per annum for a period of five years. Interest accrues at the rate of 6 percent after the 3 percent ceases to be effective.

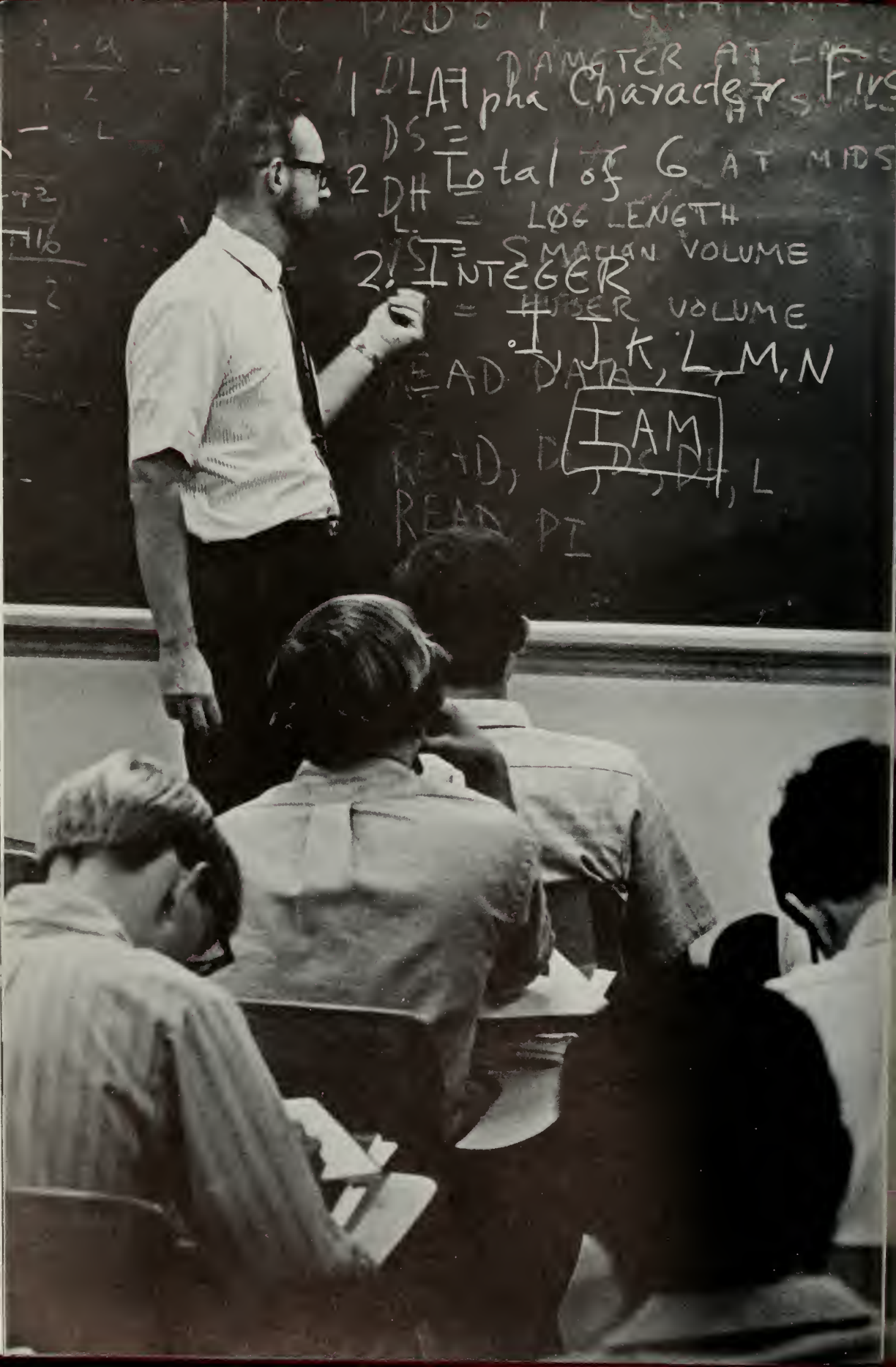
Other Funds. In addition to local loan funds, Duke University participates in the student loan program established under the provisions of the National Defense Education Act of 1958. Repayment of these loan funds normally begins one year after the student terminates full-time study. Interest accrues at the rate of 3 percent per annum commencing one year after termination of full-time study. Upon completion of the period of grace of twelve consecutive months, the ten-year an-

nual repayment period begins, and simple interest on the loan at the rate of 3 percent starts to accrue. At this point the borrower still has one additional year before his first annual payment becomes due. The first annual installment will, therefore, fall due twenty-four months after the borrower has ceased being a full-time student.

Special benefits to those teaching in non-profit schools, colleges, and universities permit a portion of the loan to be cancelled, depending upon the length of teaching service.

Applications and complete details regarding the student loan program may be obtained by writing to the Student Loan Division of Duke University. In approving loan applications, the Student Loan Committee selects those students who, from the standpoint of character, scholastic attainment, personality, and degree of financial need, are deserving of this consideration. All applications for loans should be made before July 1 preceding the academic year in which the student plans to matriculate.





1 DLA = DIAMETER AT LARGE
Alpha Character First
DS =
2 DH = Total of 6 AT MIDS
L = LOG LENGTH
2! = INTEGER
SMALLER VOLUME
= HYPER VOLUME
J, K, L, M, N
READ DATA
I AM
READ, D, DS, DH, L
READ PI

9

Courses of Instruction

General

152. Conserving Natural Resources. Fundamentals of natural resource development, use, management, and protection based on principles of the natural and social sciences. 3 units *Staff*

200. Careers in Natural Resources. A weekly seminar which surveys the research and managerial career opportunities in all fields of renewable natural resources. Required of students in Academic-Forestry program. No credit. *Staff*

Forest Biology

DENDROLOGY AND WOOD ANATOMY

241. Dendrology. Nomenclature, classification, and identification of woody plants, with special reference to the tree species indigenous to southeastern United States and other important forest regions of temperate North America. Prerequisites: Biology 1-2 or equivalent. 3 units. *Harrar and White*

290. Wood Anatomy. Study of the physical features and the gross and minute structural characteristics of wood leading to the identification of the commercial woods of the United States, and the important tropical woods used in American wood-working industries. Prerequisites: one year of biology, Forestry 241, or equivalent. 3 units. *Harrar*

292. Microtechnique of Woody Tissue. Preparation of wood for micro-

scopic study including sectioning, staining, and mounting techniques; elementary photomicrography. Prerequisites: Forestry 241 and 290 or equivalents and approval of instructor. 3 units. *Harrar*

398. Timbers of the World. A study of the properties of various groups of tropical and temperate zone woods, with particular emphasis upon those used in marine construction and for lumber, plywood, decorative paneling, and furniture. Prerequisite: Forestry 290 or equivalent. 2 units. *Harrar*

Related courses in other departments include—*Botany*: Anatomy, Systematics, Physiology; *Chemistry*: Organic Chemistry; *Civil Engineering*: Mechanical Behavior of Materials.

ECOLOGY

243. Natural Resource Ecology. An introduction to natural resource management. Emphasis put on the ecosystem as the basic unit of management. Prerequisite: Consent of instructor. 3 units. *Wuenschel*

341. Ecological Principles in Environmental Management. Discussion of the application of ecological principles to environmental manipulation. Methods of planning and managing human use of ecosystems while avoiding environmental deterioration. Stress put on the biological viewpoint. Prerequisites: general ecology and Forestry 243 or other substantive coursework in ecology. 3 units. *Wuenschel*

347, 348. Natural Resource Ecology—Environmental Management Seminar. Discussion of current ecological and environmental problems and research topics related to the management of natural resources. 1 unit. *Knoerr and Wuenschel*

354. Quantitative Analysis of Ecological and Environmental Systems. Study of quantitative methods for describing forest ecosystems. Analysis of characteristics and dynamic behavior of biological populations; development and evaluation of mathematical models for ecological, physiological, and environmental systems. Simulation techniques for ecosystem analysis will be considered. Prerequisites: Forestry 204, 243, 253, and 353. 3 units. *Chapman, Yandle, and Staff*

Related courses in other departments include—*Botany*: Ecology, Plant-Water Relations, Community Analysis and Classification, Principles of Plant Distribution, The Environment, Vegetation of North America, Evolution; *Zoology*: Animal Behavior, Vertebrate Zoology.

PHYSIOLOGY AND BIOCHEMISTRY

201. Tree Physiology. A general survey of the major physiological processes in trees and other plants, including food synthesis, growth, and water relations. Special project and term paper required. Lectures, laboratories, and readings. Prerequisite: permission of instructor. (Listed also as Botany 251.) 3 units. *Hellmers*

205. Tree Growth and Development. Life processes, growth, and development of trees, with emphasis on physiological processes and environmental influences on structure, composition, and function. 3 units. *Barnes*

207. Chemistry of Wood Tissues. Composition of wood at the elemental, molecular, and macromolecular levels, both in woody plants and in processed

woods. Distribution and properties of main components and methods of analysis. Prerequisite: organic chemistry or consent of instructor. 3 units. *Barnes*

208. Physiology of Wood Formation. Processes involved in the growth and development of woody tissues, including internal control mechanisms and effects of environmental stresses on structure and composition. Prerequisites: Forestry 201 and 241 or equivalents. 3 units. *Barnes*

305. Forest Tree Biochemistry. Study of the biological synthesis, function, and degradation of the main biochemical constituents of trees. Emphasis on cellulose and other cell-wall polysaccharides, lignins, terpenes, and phenolics and other extractives. Prerequisites: Forestry 201 and a course in biochemistry. 3 units. *Barnes*

Related courses in other departments include—*Botany*: Anatomy, Plant Metabolism, Plant-Water Relations, Physiology of Growth and Development; *Biochemistry*: Introductory Biochemistry, Chemistry of Natural Products; *Chemistry*: Organic Chemistry, Chemical Instrumentation.

PATHOLOGY

222. Biology of Forest Insects and Diseases. Fundamentals of entomology and plant pathology as applied to forest protection; coordinated laboratory work, with emphasis on identification and interpretation of forest and wood degradation. 4 units. *Anderson and Stambaugh*

223. Forest Pathology. Survey of major diseases of North American forests and their timbers, with emphasis on current literatures. Field and laboratory study in diagnosis and infection biology. Prerequisite: Forestry 222 or equivalent, or consent of instructor. 3 units. *Stambaugh*

321. Phytopathological Technique in Forestry. Fundamentals of phytopathology and their application to field and laboratory investigations of tree diseases and wood degradation; biological interpretation of host-pathogen-environment interaction is stressed in literature review, experimentation, and scientific writing. Prerequisite: Forestry 223 or equivalent. 4 units. *Stambaugh*

322. Microbiology of Forest Soils. Qualitative and quantitative characterization of the microbial populations of forest soils, with emphasis on rhizosphere interactions in root pathogenesis and mycorrhizal development; epidemiology of root diseases of trees; principles of control. Prerequisite: Consent of instructor; mycology or bacteriology is recommended. 3 units. *Stambaugh*

385. Seminar in Forest Protection. Discussion of current problems in entomology and pathology and evaluation of topical research for protection and control application in forest resource management. Prerequisites: Forestry 223 and 230. 1 unit. *Anderson and Stambaugh*

Related courses in other departments include—*Botany*: Mycology, Plant-Water Relations, Physiology of Growth and Development, Cytology, Genetics; *Chemistry*: Organic Chemistry; *Zoology*: Biological Nucleonics; *Biochemistry*: Introductory Biochemistry.

ENTOMOLOGY

222. Biology of Forest Insects and Diseases. (See description under Pathology above.)

230. Forest Entomology. Identification, biology, and control of insects that cause damage to trees and wood products. Emphasis of diagnosis is on the characteristics of the damage and the stages of the insects responsible. Prerequisite: Forestry 222 or equivalent, or consent of instructor. 3 units. *Anderson*

233. General Entomology. Principles of morphology, metamorphosis, and taxonomy of insects. Prerequisites: one course in entomology or zoology, or consent of the instructor. 4 units. (Not offered in 1971-72.) *Anderson*

331. Toxicology of Insecticides. Study of the physical, chemical, and biological properties of materials used to destroy insects. Formulation, toxicology, and insect physiology as related to insecticide action are emphasized. Prerequisite: one course in entomology; organic chemistry is recommended. 3 units. *Anderson*

332. Ecology of Forest Insects. The influence of environmental factors on the vital processes of insects, with emphasis on how both the abiotic and biotic elements influence the fluctuation of forest insect populations. Prerequisite: one course in entomology or zoology, or consent of the instructor. 3 units, 4 units with laboratory. *Anderson*

335. Entomological Research Techniques. Problem analyses, scientific writing, and laboratory and field research methods which are especially applicable to entomological problems. 1 unit. *Anderson*

385. Seminar in Forest Protection. (See description under Pathology above).

Related courses in other departments include—*Zoology*: Ecology, Systematic Zoology, Radiation Biology, Biological Nucleonics, Cellular Physiology, Invertebrate Embryology, Genetics; *Chemistry*: Organic Chemistry; *Biochemistry*: Introductory Biochemistry; *Botany*: Bacteriology; *Microbiology and Immunology*: Microbiology.

Environmental Science

347, 348. Natural Resource Ecology—Environmental Management Seminar. (See description under Ecology above.)

SOILS

261. Soils and Forest Resources. Origin, development, and classification of soils, with special emphasis on those developed in humid climates; morphological, physical and chemical properties of soils in relation to growth of trees; effect of forests on soils. Prerequisites: Chemistry 1 and 2 and Physics 1, or equivalents; physical geology, mineralogy, petrology, and analytical chemistry are also desirable. 3 units. *Ralston*

362. Forest Soil Physics. Analysis of the physical properties of soil related to the growth and development of forest trees. Consideration is given to the significance of soil moisture, temperature, aeration, and structural characteristics in the analysis of forest growth relationships. Prerequisite: Forestry 261. 3 units. (Not offered in 1972-73.) *Ralston*

364. Soil Classification and Mapping. Classification of soils as natural

bodies. Mapping of soils, land-use classes and forest-site classes; field study will be made of soil in either the coastal plain or mountains. Prerequisite: Forestry 261. 3 units. *Ralston*

366. Forest Soil Fertility. The relationships of soil fertility factors in the growth of forest trees. Emphasis is placed on the analysis of soil factors related to the mineral nutrition of trees. Prerequisite: Forestry 261; analytical chemistry is recommended. 3 units. *Ralston*

Related courses in other departments include—*Botany*: Plant-Water Relations, Physiology of Growth and Development; *Biochemistry*: Introductory Biochemistry; *Chemistry*: Chemical Instrumentation, Elements of Theoretical Chemistry; *Geology*: Sedimentary Minerals.

METEOROLOGY

203. General Meteorology. A general introduction to the science of meteorology, particularly for students concerned with problems in biology and hydrology. Emphasis is placed on the fundamentals and role of atmospheric thermodynamics and energy and mass transfer processes in determining both local and regional aspects of weather and climate. 3 units. *Vukovich*

204. Microclimatology. Introduction to the micrometeorological processes. Discussion of the integration of these processes and the resulting microclimates in the rural (forest, field, and water surface) and urban environments. Methods for modification of the microclimate. 3 units. *Knoerr*

215. Air Pollution Meteorology. The theory of transport and diffusion of air pollutants and its application to practical problems and computations involving both single sources and multiple sources, including urban communities; modeling of transport and diffusion, both in wind tunnels and computers; stack design from the meteorological point of view; the organization of meteorological networks and field studies; the measurement, monitoring, and equipment requirements of pertinent meteorological parameters; air pollution climatology; meteorological management of air pollution. Prerequisite: Forestry 203 or equivalent. (Course sponsored by Triangle Universities Consortium on Air Pollution and taught by faculty from N. C. State University). 3 units. *Staff*

217. Environmental Instrumentation. Consideration of the physical basis for measuring parameters of natural and controlled environments. Properties and effective utilization of contemporary electronic measurement and data acquisition systems, including transducers, signal conditioners, and analog and digital recorders. Methods for obtaining and processing computer compatible records. Precision measurement and calibration techniques with primary and secondary laboratory standards. Two lectures and three laboratory hours per week. Prerequisites: consent of the instructor. Students should have a basic knowledge of the properties of environmental parameters and be able to write computer programs. 3 units. *Knoerr*

304. Atmospheric Turbulence and Diffusion. Bulk and molecular aspects of atmospheric turbulence; Navier-Stokes equations and the Reynold's stresses; mixing-length and statistical turbulence theories; similarity hypotheses; turbulent transfer and diffusion in adiabatic and diabatic atmospheres; characteristics of turbulence in various scales of motion from the planetary to sub-inertial

range. Prerequisites: Forestry 203 and differential equations, or consent of instructor. 3 units. (Offered on sufficient demand.) *Vukovich*

306. Dynamics of Local Atmospheric Motion. Characteristics of atmospheric motion in the 100 m to 100 km scale. Analytic development from hydrodynamic and thermodynamic equations, incorporating appropriate scale-forcing functions of heating and terrain roughness. Theory and characteristics of land and sea breezes, mountain and valley breezes, mountain waves, and local modification of large scale atmospheric motion. Prerequisites: Forestry 203 and differential equations, or consent of instructor. 3 units. (Offered on sufficient demand.) *Vukovich*

344. Micrometeorology. Physics of the earth's surface environment, with emphasis on plant and animal microclimates; budgets of mass, momentum, and energy; vertical structure of wind, temperature, water vapor, and carbon-dioxide in relation to exchange processes within the biosphere; local circulation and eddy diffusion; principles of micrometeorological measurement. Prerequisites: Forestry 203, or equivalent, and calculus. 4 units. (Offered on sufficient demand.) *Knoerr*

Related courses in other departments include—*Mechanical Engineering*: Fluid Mechanics, Thermodynamics, Heat Transfer, Transport Phenomena, Boundary Layer Theory; *Mathematics*: Applied Mathematical Analysis, Numerical Analysis; *Chemistry*: Physical Chemistry, Chemical Instrumentation; *Botany*: Ecology, Plant-Water Relations.

HYDROLOGY

216. Watershed Hydrology. Influence of vegetation, soil types, and land forms on water yield, water quality, and flood potential. Analysis of precipitation patterns, infiltration rates, erosion forces, and sediment carrying capacities of stream. Techniques and research methods used to control the hydrologic cycle, water quality, and water yield on wild lands. 3 units. *Hellmers*

342. Hydrologic Processes. Physical processes of the hydrologic cycle, with emphasis on those processes which can be modified or controlled by watershed management. 3 units. (Offered on sufficient demand.) *Knoerr*

Related courses in other departments include—*Civil Engineering*: Hydrology, Incompressible Fluid Flow, Mechanics of Fluids; *Mechanical Engineering*: Transport; *Chemistry*: Physical Chemistry, Chemical Instrumentation; *Botany*: Ecology, Plant-Water Relations.

Resource Economics and Management

ECONOMICS AND POLICY

269. Resource Economics and Policy. Development and critical review of concepts useful in understanding and evaluating the distribution of natural resource use over time in terms of the relations between technological knowledge, group and individual behavior, and social institutions. 3 units *Convery*

270. Economics of Forestry. Development of the principles of economics useful in the analysis of the past, present, and prospective supply and demand situations for forestry goods and services; problems of the economics of the firm and industry, basic and peculiar to forestry, with special attention to the time dimensions of value; the role of forestry in the general economy, including attention to relevant institutional factors. Prerequisite: Forestry 269 or equivalent. 3 units. *Convery*

271. Financial Management. Analysis of the problems of management of the financial affairs of the firm: working capital, long-term capital needs, including the development of an optimal capital structure, with attention to tax problems. 3 units *Joerg*

272. Business Policy. An integrating course where, through analysis of case problems from the top management viewpoint, the student is given practice in arriving at effective courses of action for the solution of business problems. 3 units. *Joerg*

377. Seminar in Natural Resource Allocation and Efficiency. Evaluation of economic principles concerned with problems of natural resource allocation, with special attention to the alternatives for governmental policies in private property economics. Prerequisite: an advanced-level course in non-market decision-making or Forestry 378 or its equivalent. 2 units. *Convery*

378. Seminar in Forest Economics. Examination and discussion of the application of economic concepts in forestry; the potential contribution of economic analysis to private and public forest management; current research in forest economics. Prerequisites: Forestry 270 or consent of the instructor; advanced courses in economics and economic theory are desirable. 2 units. *Convery*

Related courses in other departments include—*Economics*: Economic Theory, History, and Systems; Economic Development, Planning, and Fluctuations; Economic Statistics; Monetary and Fiscal Theory and Institutions; International Economics; Manpower, Labor, and Population; Industrial Organization and Public Policy; *Business Administration*: Business Finance, Marketing, and Accounting.

MANAGEMENT

244. Theory and Practice of Silviculture. Principles governing establishment, treatment, and control of forest stands; natural and artificial methods of reproduction, intermediate cuttings, and cultural operations, with emphasis on the principal forest types of temperate North America. Field practice in silvicultural operations and study of managed stands. Prerequisite: Forestry 243 or equivalent. 3 units. *White*

248. Forest Regeneration. The fundamentals and application of forest tree improvement, nursery operations, and site-improvement techniques to the regeneration of forest stands by artificial and natural means. 3 units. *Chaiken and White*

256. Forest Measurements. Application of plane-surveying technique to the measurement of land area, topography, and timber type; measurement of volume and growth of forest trees and stands; measurement of forest products. 4 units. *White*

281. Forest Management. Principles of organizing forest properties for systematic management; use of data obtained in surveys and inventories; principles of forest regulation, including a study of normal and actual forests, rotations, cutting cycles, and methods of regulating the cut in even-aged and all-aged forests for sustained yield; introduction to the preparation of preliminary forest management plans. 3 units. *Chaiken*

283. Fire Behavior and Use. Impact of destructive agencies upon forests;

principles of combustion, fire behavior, danger measurement, and suppression; use of fire in forest management. 2 units. *Chaiken*

289. Interpretation of Aerial Photographs. Principles of aerial photography and remote sensing as applied to forest administration, vegetation mapping, forest mensuration, and insect and disease surveys. Corequisite: Forestry 281 or equivalent. 3 units. *Chaiken*

382. Legal Aspects of Forestry. A seminar on certain state and federal laws pertinent to the management of forests: land ownership, trespass, public liability, timber contracts, labor relations, and use of pesticides. 1 unit. *Chaiken*

386. Seminar in Forest Management. Examination and analysis of techniques employed in the management of industrial and public forests, particularly in the South; discussion of problems of large scale intensive forest management. Prerequisites: Forestry 244, 281, and 377 or equivalent. 1 unit. *Chaiken*

Related courses in other departments include—*Business Administration*: Theory of Firm, Organization Theory, Information Systems, The Firm in Society; *Political Science*: Public Administration; *Social Science*: Social Stratification, Industrial Sociology.

Statistics and Operations Research

210. Analytical Techniques in Forest Utilization. Introduction to utilization in the managed forest and principal wood-using industries and to operations analysis methods applied to scheduling and production problems in these industries. 3 units. *Yandle*

250. Biometry. Concepts and methods of statistics essential to the collection, analysis, and interpretation of resource and biological data. Emphasis is placed on problems of estimation, inference, and decision-making with experimental data. 3 units. *Yandle*

251. Theory and Methods for Sampling Biological Populations. Introductions to statistical methods for sampling natural resources and biological populations. Simultaneous consideration is given to theoretical and experimental problems in the design and applications of sampling methods and in the interpretation of sample data. Prerequisite: Forestry 250 or consent of instructor. 3 units. *Yandle*

253. Computer Science in Natural Resources. Components and organization of a computer system; automatic programming languages; storage and retrieval systems (TSAR); equation fitting by iteration and least-squares methods; graphical techniques. 3 units. *Chapman*

258. Operations Research. Mathematical model formulation and development of techniques to aid decision-making in problems of natural resource allocation and use. Includes the theory and techniques of inventory control, equipment replacement planning, queuing theory, competitive strategies, allocation, sequencing, and dynamic programming. Consideration is given to both deterministic and nondeterministic models. 3 units *Chapman and Yandle*

352. Theory and Applications of Linear Statistical Models. Theoretical development of the general linear statistical model, together with extensions to accommodate linear approximation of non-linear cases. Curve-fitting techniques

are developed, with emphasis on applications to natural phenomena. Prerequisite: consent of the instructor. 3 units. *Chapman*

353. Design and Analysis of Experiments. Extension of the theory of estimation and testing for general linear models to include the less than full rank case. Experimental design models such as factorial and incomplete block models are developed as special cases of the general theory. Emphasis is placed on field and laboratory designs, together with appropriate computerized analysis techniques. Prerequisite: Forestry 352. 3 units. *Chapman*

354. Quantitative Analysis of Ecological and Environmental Systems. (See description under Ecology above.)

Related courses in other departments include—*Mathematics*: Calculus, Numerical Analysis, Complex Analysis, Non-parametric, Statistics, Probability, Applied Mathematical Statistics, Stochastic Processes, Multivariate Statistics; *Economics*: Econometrics, Quantitative Analysis.

Special Studies and Research

299. Special Studies in Forestry. Work on the senior-graduate level to meet the needs of individual students offered in the areas of forestry and related natural resources designated under Forestry 357, 358. Credits and hours to be arranged. *Staff*

301, 302. Advanced Studies in Forestry. Work on the advanced graduate level to meet the needs of individual students is offered in the areas of forestry and related natural resources designated under Forestry 357, 358. Credits and hours to be arranged. *Staff*

357, 358. Research in Forestry. Students with adequate training may undertake special research problems under direction of members of the faculty in the following branches of forestry and related natural resources. Credits to be arranged.

1. *Forest Ecology*. Prerequisite: Forestry 243 or equivalent. *Wuenschel*
2. *Forest Soils*. Prerequisite: Forestry 261 or equivalent. *Ralston*
3. *Silviculture*. Prerequisites: Forestry 243 and 244 or equivalents. *White*
4. *Forest Management*. Prerequisite: Forestry 281 or equivalent. *Chaiken*
5. *Forest Economics*. Prerequisite: Forestry 270 or equivalent. *Convery*
6. *Forest Anatomy and Properties*. Prerequisites: Forestry 241 and 290 or equivalents. *Harrar*
7. *Forest Mensuration and Biometry*. Prerequisites: Forestry 250 and 352 or equivalents. *Chapman*
8. *Forest Entomology*. Prerequisite: Forestry 230 or equivalent. *Anderson*
9. *Forest Operations Research*. Prerequisite: consent of instructor. *Yandle*
10. *Dendrology*. Prerequisite: Forestry 241 or equivalent. *Harrar and White*
11. *Forest-Tree Physiology*. Prerequisites: plant physiology and plant or forest ecology. *Kramer, Hellmers, and Barnes*
12. *Forest Pathology*. Prerequisites: plant physiology and Forestry 223 or equivalents. *Stambaugh*
13. *Forest Meteorology and Hydrology*. Prerequisites: Forestry 203, 342, or equivalents. *Knoerr*
14. *Forest Biochemistry*. Prerequisites: plant physiology and organic chemistry. *Barnes*

368. Field Seminars. Field studies, consultations, and visits to areas of interest during spring vacation period, or at other times, in the several branches of forestry and related natural resources listed under Forestry 357, 358. Credits to be arranged. *Staff*

Numerical Listing of Courses

152. Conserving Natural Resources. 3 units
200. Careers in Natural Resources. No credit
201. Tree Physiology. 3 units
203. General Meteorology. 3 units
204. Microclimatology. 3 units
205. Tree Growth and Development. 3 units
207. Chemistry of Woody Tissues. 3 units
208. Physiology of Wood Formation. 3 units
210. Analytical Techniques in Forest Utilization. 3 units
215. Air Pollution Meteorology. 3 units
216. Watershed Hydrology. 3 units
217. Environmental Instrumentation. 3 units
222. Biology of Forest Insects and Diseases. 4 units
223. Forest Pathology. 4 units
230. Forest Entomology. 3 units
233. General Entomology. 4 units
241. Dendrology. 3 units
243. Natural Resource Ecology. 3 units
244. Theory and Practice of Silviculture. 3 units
248. Forest Regeneration. 3 units
250. Biometry. 3 units
251. Theory and Methods for Sampling Biological Populations. 3 units
253. Computer Science in Natural Resources. 2 units
256. Forest Measurements. 4 units
258. Operations Research. 3 units
261. Soils and Forest Resources. 3 units
269. Resource Economics and Policy. 3 units
270. Economics of Forestry. 3 units
271. Financial Management. 3 units
272. Business Policy. 3 units
281. Forest Management. 3 units
283. Fire Behavior and Use. 2 units
289. Interpretation of Aerial Photographs. 3 units
290. Wood Anatomy. 3 units
292. Microtechnique of Woody Tissue. 3 units
299. Special Studies in Forestry. Credits to be arranged
- 301-302. Advanced Studies in Forestry. Credits to be arranged.
304. Atmospheric Turbulence and Diffusion. 3 units
305. Forest Tree Biochemistry. 3 units
306. Dynamics of Local Atmospheric Motion. 3 units
321. Phytopathological Technique in Forestry. 4 units
322. Microbiology of Forest Soils. 3 units
331. Toxicology of Insecticides. 3 units
332. Ecology of Forest Insects. 3 units, 4 units with laboratory
335. Entomological Research Techniques. 1 unit
341. Ecological Principles in Environmental Management. 3 units
342. Hydrologic Process. 3 units
344. Micrometeorology. 4 units
- 347-348. Natural Resource Ecology—Environmental Management Seminar. 1 unit
352. Theory and Applications of Linear Statistical Models. 3 units
353. Design and Analysis of Experiments. 3 units
354. Quantitative Analysis of Ecological and Environmental Systems. 3 units
- 357-358. Research in Forestry. Credits to be arranged
362. Forest Soil Physics. 3 units
364. Soil Classification and Mapping. 3 units
366. Forest Soil Fertility. 3 units
368. Field Seminars. Credits to be arranged.
377. Seminar in Natural Resource Allocation and Efficiency. 2 units
378. Seminar in Forest Economics. 2 units
382. Legal Aspects of Forestry. 1 unit
385. Seminar in Forest Protection. 1 unit
386. Seminar in Forest Management. 1 unit
398. Timbers of the World. 2 units

Appendix

Enrollment

REGISTERED FOR THE MASTER OF FORESTRY DEGREE

Austin, John Towneley (Furman University). High Point, North Carolina
Bell, William Lee (Tennessee Wesleyan College). Copperville Tennessee
Bergstresser, Peter Snyder (Elizabethtown College). Harrisburg, Pennsylvania
Boli, Eugene Clark (B.S., Columbia College). Xenia, Ohio
Butler, Elizabeth Ann (Duke University). Colorado Springs, Colorado
Cook, Jeffrey Odlin (B.S., University of Maine). Fairfield, Maine
Davison, Laird Allen (Iowa Wesleyan College). Ridgewood, New Jersey
Dodd, William Harrison, Jr. (A.B., Dickinson College). Carlisle, Pennsylvania
Edeburn, Judson Dunwoody (B.S., Marshall University). Shoals, West Virginia
Ellsworth, Burton Leslie (Elizabethtown College). Myerstown, Pennsylvania
Everest, Raymond John (Guilford College). Winston-Salem, North Carolina
Fleming, John Edwin (B.A., Gettysburg College). Penfield, New York
Geyer, Paul Bennett (Gettysburg College). Gettysburg, Pennsylvania
Globig, Jonathan Fredrick (B.A., Johns Hopkins University). St. Louis, Missouri
Hartlage, James Lee (Marshall University). Portsmouth, Ohio
Hermann, Gary Bruce (Ohio University). Denville, New Jersey
Howell, Fred Carlton (Baylor University). Tulia, Texas
Hutchinson, Joanna (B.A., Yale University). Southport, Connecticut
Karakash, John Thomas (B.A., Gettysburg College). Bethlehem, Pennsylvania
Kauffman, Bruce Wentland (Ohio University). Canton, Ohio
Kincaid, Dan Burton (B.S.F., West Virginia University). Columbus, Ohio
Leatherman, David Allen (B.S., Marietta College). Columbus, Ohio
Lilly, Stuart Carlton (Duke University). San Pedro, California
Loeb, Mitchell Levy (Franklin and Marshall College). Lancaster, Pennsylvania
Lubs, John Andrew (B.S., Wisconsin State University). Chippewa Falls, Wisconsin
Marshall, Philip Thomas (B.A., Catawba College). Royal Center, Indiana
McNaull, James Neal (A.B., University of North Carolina; M.Div., Union Theological Seminary). Durham, North Carolina
Mead, Delbert Ray (B.S., Albright College). Montrose, Pennsylvania
Meinig, Robert Richard (B.A., Duke University). Reading, Pennsylvania
Metes, Nicholas Stefan (B.A., Miami University). Jackson Heights, New York
Nelson, Larry Robert (Ohio University). Canton, Ohio
Nettleton, Wesleyan Allen (Stetson University). Guilford, Connecticut
Noell, Forrest Dale (B.S., Ohio University). Portsmouth, Ohio
Owston, Robert David (B.A., Thiel College). Jamestown, Pennsylvania
Peifer, Arthur Lee (Elizabethtown College). Elizabethtown, Pennsylvania
Peterson, Mark David (B.A., Clinch Valley College of the University of Virginia). Big Stone Gap, Virginia
Pfortner, Raymond George (B.S., Yale University). Woodcliff Lake, New Jersey
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Rocap, John Benjamin (Gettysburg College). Millville, New Jersey
Schlinker, James Wallace (B.S., Muhlenberg College). Silverdale, Pennsylvania
Schnabel, Douglas Paul (B.S., Virginia Military Institute). Bethel Park, Pennsylvania
Shay, Patrick Fred (Gettysburg College). Lebanon, Pennsylvania
Starrett, James Moore (B.A., Davidson College). Morganton, North Carolina
Stewart, Carol Frances (B.S., Mount Union College). Wexford, Pennsylvania
Tait, Terrence Lee (Miami University). Dayton, Ohio
Vasevich, Joseph Michael (Franklin and Marshall College). Easton, Pennsylvania
Woodall, Stephen Lamar (Duke University). Clayton, Georgia

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Degrees Conferred 1970-71

MASTER OF FORESTRY

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Davis, James Brett
Heinsch, Robert Carl, Jr.
Matuszewski, Mark

Schoenholz, James Allen
Simkins, Wayne Harvey
Somes, Horace Arthur, Jr.
Wilson, Stephen Edward

DOCTOR OF PHILOSOPHY

Armstrong, Frank H. (B.S., West Virginia University; M.F., Yale University). Dissertation: "Selection Forest Yield Regulation by Parametric Linear Programming."
Ham, Donald L. (B.A., William Jewell College; M.F., Duke University). Dissertation: "The Biological Interactions of Sulfur Dioxide and Schirraia Acicola in Loblolly Pine."
Romancier, Robert Marshall (B.S., University of Massachusetts; M.F., Yale University). Dissertation: "Ecology of the Seedling Establishment of **Rhodendron Maximum L.** in the Southern Appalachians."
Wilkinson, Thomas George (B.S.; M.F., Duke University). Dissertation: "Studies on the Effects of Ozone on Photosynthetic Processes in **Pinus Strobus.**"

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MAP OF DUKE UNIVERSITY

East Campus

A	Baldwin Auditorium	O	Pegram House
B	Bassett House	P	Duke Press
C	Brown House	Q	Infirmary
D	Union Building	R	Ark
E	Faculty Apartments	S	Crowell Building
F	Art Museum, Geology	T	Epworth Inn
G	Aycock House	U	Gilbert-Addams House
H	East Duke Building	V	Southgate Hall
I	West Duke Building	W	Campus Center
J	Jarvis House	X	Woman's College
K	Car: Building	Y	Gymnasium
L	Giles House	Z	Asbury Building
M	Woman's College Library	AA	Bivins Building
N	Alsbaugh House	BB	Art Building
			Branson Building



West Campus

A	Duke Chapel	H	Hospital Main Entrance	D	Craven Quadrangle	V	Card Gymnasium
B	Divinity School	I	Gerontology, D & T,	P	Wannamaker Hall	W	Indoor Stadium
C	Gray Building	J	Clinical Research	Q	Crowell Quadrangle	X	School of Law
D	Perkins Library	K	Duke Hospital	R	Clock Tower Court	Y	Gross Chemical Laboratory
E	Language Center	J	Sociology, Psychology	S	Kilgo Quadrangle	Z	Biological Sciences
F	Old Chemistry Building	L	Social Sciences	T	Union Building	AA	Plant Environment
G	Davison Building	M	Allen Building	U	Flowers Building		Laboratory
	School of Medicine	N	Few Quadrangle		Page Auditorium	BB	Physics Building
						CC	Nuclear Laboratory
						DD	School of Engineering
						EE	Army Research
						FF	Medical Center Research
							Buildings
						GG	Nanaline H. Duke Medical
							Sciences Building
						HH	Warehouse, Shop
						II	Bell Building
						JJ	Hanes House
							School of Nursing
						KK	Hanes House Annex
						LL	Pickens Rehabilitation
							Center
						MM	Graduate Center
						NN	Alumni House
						DO	Commonwealth-Studies
							Center
						PP	Personnel Office
						QQ	International House
						RR	Personnel Office
						SS	Education Improvement
							Program,
							A Better Chance Program
						TT	International Studies
							Center
						UU	Campus Stores Office
						VV	Office of Institutional
							Advancement
						WW	Information Services
							Visitors Bureau
						XX	Admissions Office
						YY	Edens Quadrangle
						ZZ	Wade Stadium



BULLETIN OF DUKE UNIVERSITY
School of Forestry

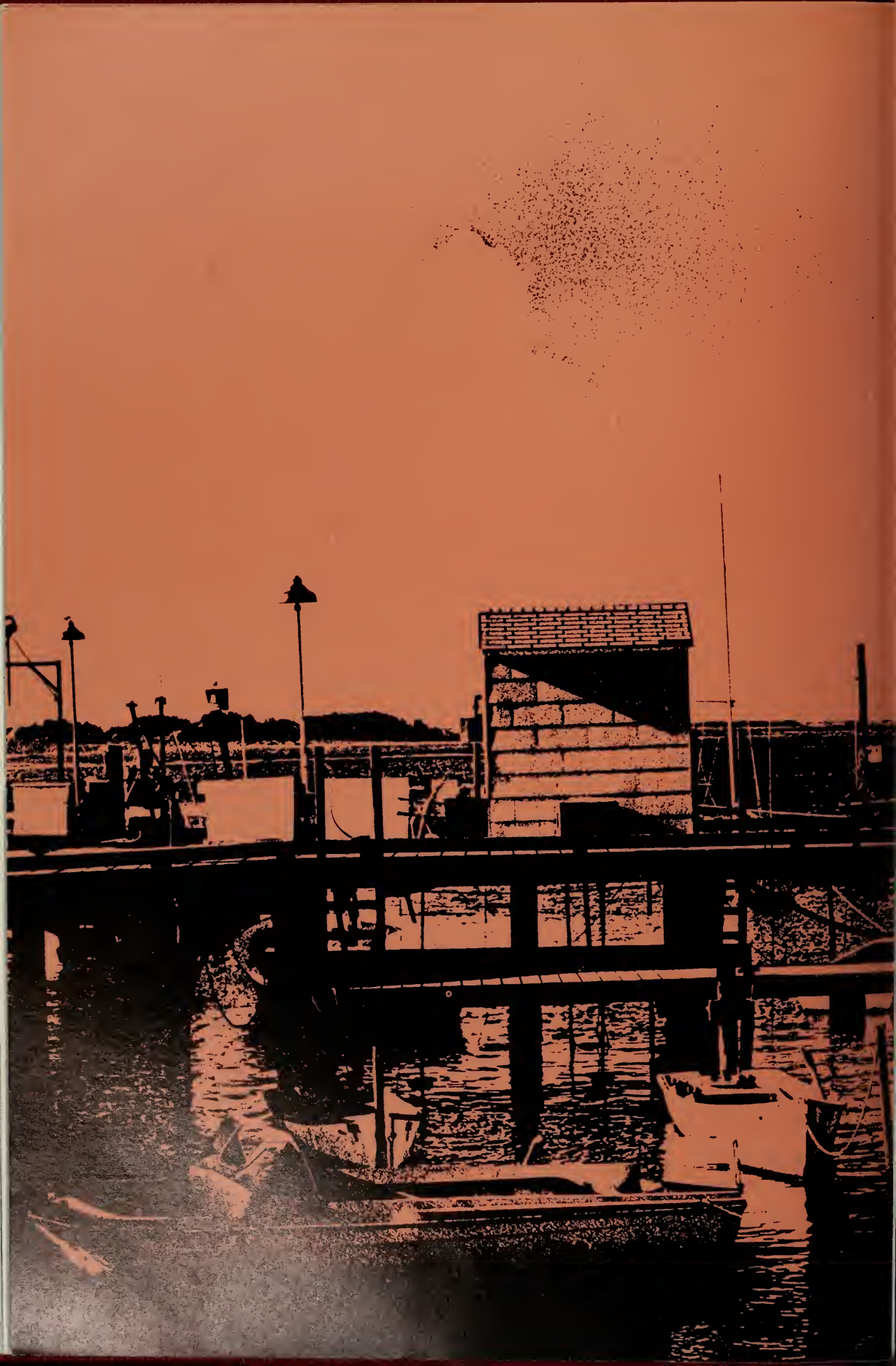
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Marine Laboratory
Beaufort , North Carolina





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Marine Laboratory

1972-1973

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1

General Information

The Laboratory

Through the efforts of Dr. A. S. Pearse, the Duke University Marine Laboratory was founded in 1938 on Pivers Island near the town of Beaufort, North Carolina. It was established initially to offer teacher training at the senior-graduate level, but research soon became an integral part of the program. Studies are currently being conducted in the fields of ecology, systematics, physiology, embryology, mycology, algology, and biological, chemical, geological, and physical oceanography. In addition to the graduate program, a newly established interdisciplinary program in the marine sciences now makes it possible for qualified undergraduates to spend the spring semester, 1973, at the Laboratory.

The Duke University Marine Laboratory presently occupies fifteen acres of the southern portion of Pivers Island; the U.S. Department of Commerce, NOAA, National Marine Fisheries Service, Center for Menhaden Research encompasses the remainder of the island.

The physical plant consists of eighteen buildings including four dormitories, a large dining hall, one residence, boathouse, storehouse for ship's gear, classroom laboratories, and five research buildings. The research laboratories and one modern dormitory are heated and air-conditioned, thereby providing favorable conditions for year-round research.

Pivers Island is only 150 yards across the channel from the town of Beaufort. A bridge leads to U. S. Highway 70, so the Island is readily accessible by automobile. The only direct means of public transportation to Beaufort is by bus. The closest airport (served by Piedmont Airlines) is in New Bern, North Carolina, a distance of forty miles from Beaufort. Upon arrival at Beaufort, the Laboratory may be reached by taxi.

The Beaufort area is well known for its moderate climate during the summer. Air temperatures range from an average minimum of 70° F. to an average maximum of 86° F. There is a prevailing southwest breeze from the ocean during most of the summer. Water temperatures range from 22-29° C. in June and from 24-30° C. during August.

Students should bring clothes suitable for field work including a sun hat, tennis shoes, bathing suit, shorts, work gloves, and sunglasses.

There are ample opportunities for recreation in and around Beaufort for swimming, fishing, boating, and water-skiing. On campus there are recreational facilities for swimming, diving, shuffleboard, horseshoe pitching, volleyball, croquet, and table tennis.



2

Resources for Study

Flora and Fauna

Beaufort is approximately midway between Woods Hole, Massachusetts, and Miami, Florida, in an area within the range of both the northern and southern species of biota. The edge of the Gulf Stream system is about 35 miles offshore, and between it and the shore occasional reefs are found.

The Beaufort area is strategically located for biological research because of the richness of its flora and fauna, and the ease with which one may reach many diverse habitats. From the Laboratory, by boat or automobile, the ocean, Cape Lookout and the Outer Banks, Bogue and Core Sounds, Harker's Island, rivers, creeks, canals, mud flats, sand beaches, dunes, marshes, peat bogs, cypress swamps, bird islands and rookeries, and coastal forests are readily accessible. Long leaf pine, yaupon, and at least seven species of insectivorous plants (protected by law), including the Venus flytrap, grow in the region. A great variety of algae, both fresh-water and marine, is also available for study. Common animals include the king crab, squid, shrimps, snails, clams, ctenophores, jellyfish, hydroids, sponges, polychaetes, sea urchins, starfish, brittle stars, sand dollars, skimmers, terns, gulls, herons, sea turtles, porpoises, and many different types of fish.

Research Facilities

Laboratory Equipment and Supplies. Visiting investigators may obtain research space throughout the year. Each research laboratory building is air-conditioned and equipped with running sea water through a hard rubber system. There are tanks, water tables, aquaria, autoclave, ovens, and plant presses. In addition to commonly used laboratory equipment, the following are available: two refrigerated centrifuges with multi-speed attachments, Beckman DU spectrophotometer, balances, pH meters, hoods, and constant temperature equipment. Each person is

expected to supply his own optical equipment or other special apparatus needed. A list of equipment, chemicals, and glassware may be obtained upon request. The laboratory also maintains a darkroom and well-equipped workshop.

Oceanographic Study. The 117.5-foot research vessel *Eastward* with a capacity for forty students on eight-hour cruises or fourteen students and staff on extended cruises may be used for oceanographic research. During the present year, the ship will operate on the eastern seaboard from Virginia to Florida and beyond the Continental Shelf. It is outfitted with modern recording and collecting devices, and is available to investigators and teachers of graduate courses in marine sciences and their students. Application for ship time must be made in advance. Inquiries should be addressed to the Oceanographic Program Director, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Collecting. Spades, shovels, sieves, and nets are provided without charge to assist the investigator with his collecting. A wide assortment of boats is available for various collecting activities. A complete schedule of boats and charges may be found in the section on Financial Information.

Library. The Pearse Memorial Library contains over 3,850 catalogued reference books and journals, 145 current journals, and 15,250 reprints. A microfilm library of graduate student theses based on research at the laboratory, a microfilm reader, and a Xerox copier are also available. The librarian may obtain other materials by a special delivery system from the Perkins Library on the main campus or through the interlibrary loan service.

Reference Collections. A reference collection of approximately 1,500 different species of animals from coastal North Carolina is available to students and research personnel. Small collections of marine algae and vascular flora are also maintained, as well as a checklist by habitat of the common marine animals.







3

Financial Information

Tuition

Summer Terms. The following tuition charges for the summer registration and medical care:

1. Undergraduate students: \$180.00 for each non-laboratory course; \$240.00 for each undergraduate laboratory course; and \$360.00 for each two-course (six-unit) program offered at the Duke Marine Laboratory.
2. Graduate students: \$60.00 per unit; and for an undergraduate course, the tuition rate indicated in section 1 above is applicable.
3. Full-time teachers in elementary and secondary schools: one-half of the tuition charge specified in sections 1 and 2 above is applicable.

The Director of the Summer Session will notify the applicant of course approval. Tuition should then be paid promptly to the Director of the Summer Session, Duke University, Durham, North Carolina 27706, to assure reservation in a course.

Spring Term. Tuition, at the rates indicated in the *Bulletin of Undergraduate Instruction* and the *Bulletin of the Graduate School*, will be paid at Duke University not later than the day of registration for the term. Students who register at a date later than that prescribed in the University Calendar will be required to pay the late registration fee indicated in the above bulletins.

Research Space

Individual research cubicles varying from 80 to 300 square feet are available at Duke University Marine Laboratory. The rental fee for research space is \$1.25 per sq. ft. per month from May 1, 1972, to April 30, 1973.

No additional charges are made for research assistants occupying the same research space as the investigators. Graduate students from institutions other than



Duke University will be charged one-half the regular rate per person. Laboratory space rental does not apply to students participating in the Spring Undergraduate Program.

Inquiries and requests for space should be addressed to Director, Duke University Marine Laboratory, Beaufort, North Carolina 28516. Applications for the academic year are encouraged and will be acted upon shortly after they are received. All research applications for the summer 1972 must be received by March 10, 1972.

Living Accommodations

Dormitories. Air conditioned and a few non-air conditioned dormitory rooms are available. Although every effort is made to limit two people per dormitory room, a few triple rooms may be needed to accommodate all individuals requiring dormitory space. Prospective students should indicate their preference for housing on the application for enrollment. It is impossible to guarantee that these preferences will be available in all cases.

Occupants must supply their own linens, blankets, and towels, but pillows will be furnished. All dormitory occupants will be on the board system during the summer terms. A key deposit of \$1.00 will be charged each person occupying a dormitory room, with the deposit to be refunded at time of departure.

Dormitory charges which are payable at the Business Office of the Laboratory upon arrival are as follows:

Summer 1972

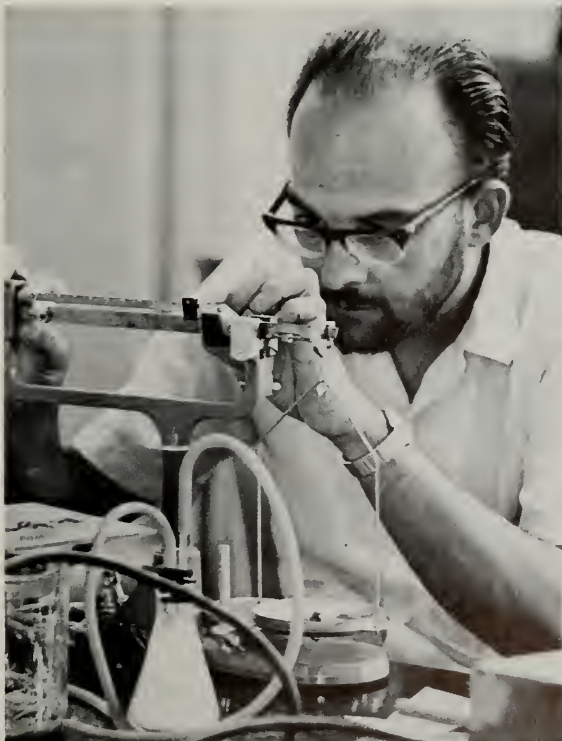
Non-air conditioned double	\$57.00 per term for each occupant
Air conditioned double	\$72.00 per term for each occupant
Air conditioned triple	\$52.00 per term for each occupant

Spring 1973

Non-air conditioned double	\$190.00 per semester for each occupant
Air conditioned double	\$220.00 per semester for each occupant
Air conditioned triple	\$180.00 per semester for each occupant

Double rooms for married students are normally supplied only if both husband and wife are registered students at the Laboratory.

Beaufort Housing. Because Beaufort is located in a resort area, off-campus housing is very difficult to obtain and costs may range from \$20.00 to \$50.00 per week per person. Housing for married couples who are not both registered students at the Laboratory and couples with children in the Morehead City-Beaufort area is limited. A list of area realtors will be mailed to students upon request.



Dining Facilities

The Duke University Marine Laboratory Dining Hall will be open for both terms of the summer session. All dormitory residents are required to pay the full board fee of \$130.00 per term. Students residing off-campus may purchase a full board meal ticket, weekly meal ticket, or individual meals. Individual meals are the most expensive and full board is the least expensive on a meal-by-meal basis. Individual meal rates are as follows:

Breakfast	\$.90
Lunch	\$1.50
Dinner	\$2.00
Sunday Dinner	\$2.30

Children under twelve will be charged one-half the adult rate.

The full board fee (at approximately a 12 percent savings from individual meals) provides for three meals per day, Monday through Saturday, and breakfast and noon dinner on Sunday. No credit will be allowed for meals that are missed, including those meals which may be missed as a result of research cruises in conjunction with course work. Meals will normally be provided on these cruises.

Research personnel and their families residing off-campus are urged to eat in the dining hall. Arrangements may be made for occasional meals if sufficient notice is given at the Business Office of the Laboratory.

The board fee is payable in full on or before the day of registration at the Business Office of the Laboratory.

Boat Rentals

The following boats are available at the Laboratory for collecting and instructional activities:

Boat Type	Name	Charges
		(May 1, 1972 to April 30, 1973)
55 ft. trawler	Beveridge*	\$ 23.00 per hour
		\$184.00 per day
39 ft. cabin Diesel powered	Venus*	\$ 12.00 per hour
		\$100.00 per day
17.5 ft. speedboat	Thunderbird	\$ 12.00 per hour
		\$100.00 per day
22.10 ft. open boat	Ocypode	\$ 12.00 per hour
		\$100.00 per day
Boston Whaler		\$ 5.00 per hour
		\$ 40.00 per day
Skiffs with outboard motors		\$ 3.00 per hour
		\$ 21.00 per day

*Crew required for safety of user and vessel.

These rates are intended to partially defray the cost of operating and maintaining these boats.

These boats may be scheduled by visiting researchers through the Business Office; however, first priority must be given to classes when they are in session during the spring and summer terms.

If crew overtime is involved before or after their normal work day and anytime Saturday or Sunday, the following charges will be made from May 1, 1972, to April 30, 1973: Master, \$4.50 per hour; Winch Operator, \$4.25 per hour; additional charge for overtime on Duke University holidays, \$3.00 per hour.

Other Financial Information

Check Cashing. The banks in the Morehead City-Beaufort area have indicated that they will not cash personal checks for students unless they are guaranteed. Therefore, it is recommended that students at the Laboratory bring with them sufficient travellers checks, money orders, certified checks, or cash to cover expenses.

Other fees. Late registration fees will be charged in accordance with Duke University policy unless registration is completed and all fees paid by the last day of registration for the term.

Awards

Undergraduate. Undergraduate students who wish to be considered for appropriate financial awards should write to the Director, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

NSF Predoctoral Research Awards. Predoctoral Oceanographic Training Awards in Biological Oceanography are available each year. Students from any accredited university in the United States may apply. The award is intended for the graduate student who has completed his course work for the master's degree or the Ph.D. candidate who has passed his preliminary examination and wishes to utilize the *R/V Eastward* in his thesis research.

The awards are funded by the National Science Foundation, but are administered by Duke University, and supply up to \$4,800. per year for the support of an oceanographic trainee. They are intended for one year, but may be renewed if the progress of the student warrants this extension. In special situations the award may be given for periods shorter than a year. Funded amounts are available for equipment, expendables, and travel, but there is no tuition allowance. Generally, it is expected that the student will not be engaged in class work during the tenure of the award.

All inquiries should be addressed to the Oceanographic Program Director, Duke University Marine Laboratory, Beaufort, North Carolina 28516. Applications should be completed by January 15.

NSF Postdoctoral Research Awards. A limited number of Postdoctoral Awards in Marine Biology will be offered for 1972.

All inquiries should be addressed to the Director, Duke University Marine Laboratory, Beaufort, North Carolina 28516. Applications should be completed by March 10.



4

Admission

Requirements and Procedures

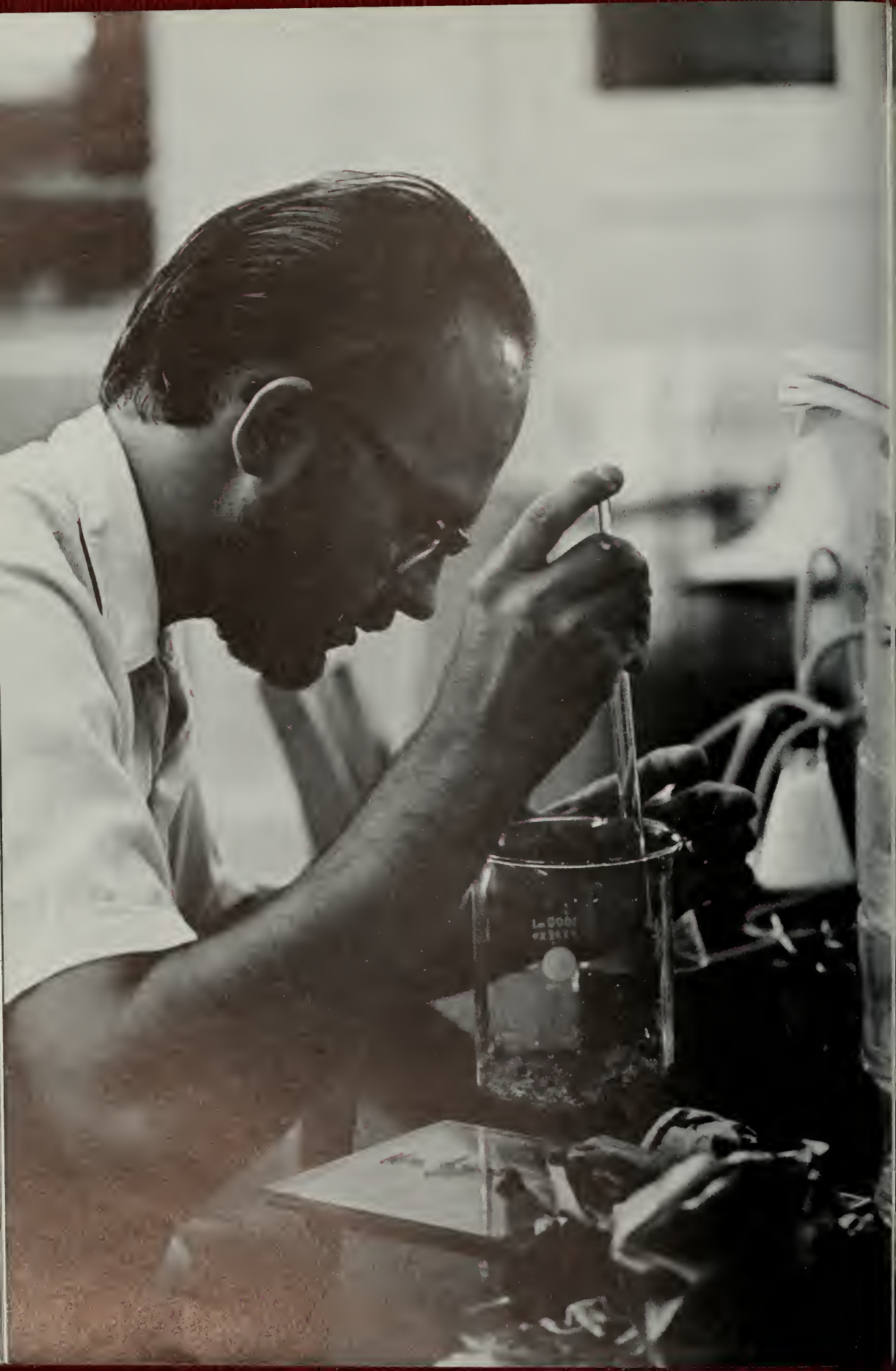
All students applying to the Duke Marine Laboratory should complete the appropriate application form at the back of this *Bulletin* and submit a transcript of their grades. Applicants will be considered without regard to race, color, religion, sex, or national origin. Students desiring a transfer of credit to their home institutions should request a course approval form for transfer of credit from the Director, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Summer Terms. All courses offered at the Laboratory during the summer are intended for graduate students and senior undergraduate students. Applications should be submitted to the Director of the Laboratory as early as possible and not later than March 10. Late applicants will be admitted if space permits. After acceptance, payment of tuition is essential to assure reservation in a course.

Students wishing to apply summer credits toward an advanced degree at Duke University must, in addition to filling in the application blank, register with the Duke University Graduate School. Students who have had adequate preparation and approval of their major professor may request space for independent or thesis research.

The last day of registration and suggested time of arrival for the second term is 12:00 noon so that students may complete their registration prior to 4:00 p.m., June 19. Upon arrival students should report to the Laboratory Business Office for room assignments. Classes commence at 8:00 a.m., June 20. Third term personnel should report not later than 4:00 p.m., July 24. Classes commence at 8:00 a.m., July 25.

Spring Semester. A new interdisciplinary program in the marine sciences is offered at the Duke Marine Laboratory for the spring semester. The program is open to qualified juniors and seniors from Duke and other colleges and universities. Applications are to be submitted by October 7, 1972, to the Director of the Laboratory. Each applicant should request two letters of recommendation, one of which must be from the director of undergraduate studies, or the equivalent, from the student's major department. Students will be notified of the action of the admission committee prior to preregistration for the spring semester.



5

Courses of Instruction

Second Summer Term

June 19-July 21, 1972

Independent Study. (Botany, Geology, or Zoology 192T.) For senior and junior majors with permission of the appropriate director of undergraduate studies and the supervising instructor. Course credit to be arranged. *Staff*

Marine Phycology. (Botany 211.) An introduction to marine algae—their identification, taxonomy, morphology, physiology, and ecology. Field trips are complemented by laboratory study, culturing, and preparation of herbarium material. Two courses (6 graduate units). *Searles*

Biological Oceanography. (Zoology 214.) Composition in time and space of marine biosphere in relation to descriptive marine chemistry, physics, and geology. Some work at sea aboard the research vessel. Prerequisites: one year of physics and mathematics and permission of instructor. Two courses (6 graduate units). *Barber*

Marine Ecology. (Zoology 203.) Ecological processes as exemplified by marine organisms. Lectures will cover environmental factors, intra- and inter-specific relationships, and community ecology. Class discussions on selected papers. Field projects utilizing current ecological methods. Practice in scientific writing. Use of computers in ecology. Prerequisites: a course in general zoology, invertebrate zoology, or an appropriate equivalent, and a year of mathematics; some knowledge of statistics will be helpful. Two courses (6 graduate units). *Sutherland*

Comparative and Evolutionary Biochemistry. (Biochemistry or Zoology 276.) Lectures and discussion of the origin of life, evolution of the genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and inverte-

brates. Techniques used include salt fractionation, electrophoresis, ion-exchange and molecular exclusion chromatography, fingerprinting, molecular weight determination, amino acid composition, and other related approaches. Prerequisite: consent of the instructor. Two courses (6 graduate units). *Sullivan*

Invertebrate Embryology. (Zoology 278.) Lectures, readings, and laboratory work dealing with rearing, development, and life history of invertebrates. Prerequisite: Zoology 92. Two courses (6 graduate units). *Bookhout*

Research. (Zoology 354.) Hours to be arranged. Prior approval of instructor at the Duke University Marine Laboratory required. (For graduate students only.) *Staff*

Third Summer Term

July 24-August 25, 1972

Independent Study. (Botany, Geology, or Zoology 191T.) For senior and junior majors with permission of the appropriate director of undergraduate studies and the supervising instructor. Course credit to be arranged. *Staff*

Marine Membrane Physiology. (Physiology 212.) Physiology of marine and estuarine organisms, with emphasis on cellular transport processes and electrophysiology. The course will include the functions, mechanisms, and comparative aspects of ionic and osmotic regulation in marine plants and animals. Laboratory work will deal with transport processes in gills and other epithelia, basic electrophysiology and synaptic transmission in mollusks, kidney function in fish, amino acid transport and metabolism in crustaceans, and the application of radiotracer and other physical and chemical techniques to the study of membrane function. Prerequisite: permission of instructor. Two courses (6 graduate units). *Gutknecht, Schoffeniels, Wachtel, and Staff*

Geological Oceanography. (Geology 205.) The study of the broad geologic aspects of the ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary processes. Observations in the field will be emphasized and will include training in sampling procedures for both shallow and deep water. (This course is not open to students who have completed Geology 206.) Two courses (6 graduate units). *Pilkey*

Physiological Ecology of Marine Animals. (Zoology 250.) A study of the physiological responses of marine animals in relation to certain environmental factors and evolution. Animals representing numerous phyla from various habitats are studied. Prerequisite: a course in physiology. Two courses (6 graduate units). *Forward*

Marine Invertebrate Zoology. (Zoology 274.) A study of invertebrate animals that occur in the Beaufort region. A number of field trips will be made to a variety of habitats to study and to collect animals in their natural environment. The structure and habits of living invertebrates, as well as their behavior under experimental conditions, will be studied in the laboratory. (Zoology 274 is not intended for students who have had a graduate course in invertebrate zoology.) Prerequisite: a



course in general zoology or general biology. Two courses (6 graduate units).
Staff

Introductory Marine Microbiology. (Botany 205.) The biology of microorganisms in oceans and estuaries. Prerequisite: one year of college biological science. Two courses (6 graduate units). *Staff*

Research. (Zoology 353.) Hours to be arranged. Prior approval of instructor at the Duke University Marine Laboratory required. (For graduate students only.) *Staff*

Spring Semester—Undergraduate Program

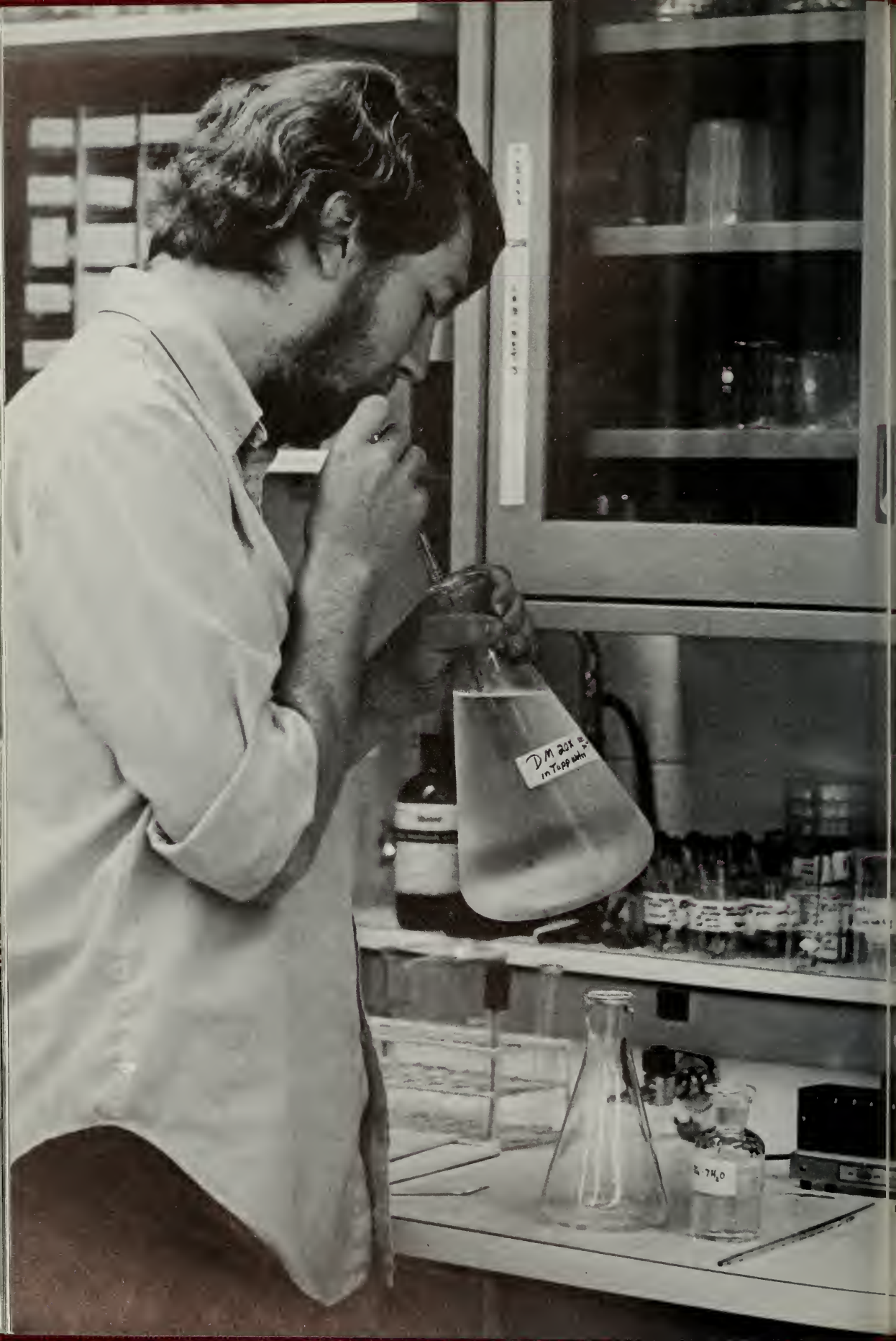
The semester program consists of the courses listed below. A student may apply during the spring to continue study at the Marine Laboratory during the summer either by participating in senior-graduate courses or by continuing the independent studies initiated during the spring term.

Man and the Marine Environment. (Interdisciplinary Course 104.) Economic, legal, medical, political, social, and scientific viewpoints on the extent to which modern society has affected the marine environment, with special emphasis on problems of coastal North Carolina. Lectures and laboratories. Prerequisite: consent of instructor and director of undergraduate studies of student's major department. One course. *Costlow and Staff*

The Marine Environment. (Botany, Geology, or Zoology 169). The interrelationships of the geological, chemical, and biological aspects of the estuarine and oceanic environments. Lectures and laboratories. Prerequisite: introductory chemistry and consent of instructor and the appropriate director of undergraduate studies. One course. *Sutherland and Staff*

Marine Sciences Seminar. (Botany, Geology, or Zoology 171.) Lectures and discussions on current research involving biological, chemical, and geological aspects of estuarine and oceanic environments. Prerequisite: consent of instructor and the appropriate director of undergraduate studies. Half-course. *Barber and Staff*

Independent Study. (Botany, Geology, or Zoology 192T.) For senior and junior majors with permission of the director of undergraduate studies and the supervising instructor. One and one-half courses. *Staff*



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Seminars

Academic Year 1970-1971

Date	Speaker	Topic
Sept. 29	Dr. John A. Allen Dove Marine Laboratory Cullercoats, North Shields Northumberland, England	Studies on deep-sea pelecypods
Oct. 2	Professor Dean Martin Department of Chemistry and Marine Science Institute University of South Florida Tampa, Florida	Recent red tide research
Oct. 20	Dr. Richard W. Eppley Scripps Institution of Oceanography La Jolla, California	Nitrogen assimilation in marine phytoplankton
Nov. 5	Dr. Gene R. Huntsman National Marine Fisheries Service Center for Estuarine and Menhaden Research Beaufort, North Carolina	Dynamics of menhaden populations
Nov. 23	Mr. Victor DeVlaming University of California Berkeley, California	Environmental and endocrine control of reproductive cycling in the Estuarine Goby, <i>Gillichthys mirabilis</i>
Dec. 2	Dr. R. G. Wear Victoria University Wellington, New Zealand	Current research on New Zealand decapod larvae

Dec. 9	Dr. Lennard Gidholm Klubbans Biologiska Station Fiskebackskil, Sweden	Sexual biology in the polychaete <i>Autolytus</i>
Dec. 10	Dr. Lawrence R. Pomeroy University of Georgia Athens, Georgia	The strategy of mineral cycling
Dec. 16	Dr. Moshe Tsurnamal Hebrew University Jerusalem, Israel	Symbiotic associations of fishes of the family Gobiidae with Alpheid prawns in the Red Sea
Jan. 14	Dr. Ralph G. Johnson University of Chicago Chicago, Illinois	The organization of benthic marine communities
Jan. 15	Dr. John Ogden Smithsonian Tropical Research Institute Balboa, Canal Zone	Ecology and behavior of parrotfish on a San Blas coral reef
Feb. 11	Dr. Rudolf S. Scheltema Woods Hole Oceanographic Institution Woods Hole, Massachusetts	Dispersal of larvae as a means of genetic exchange between widely separated populations of shoal-water benthic invertebrates
March 24	Dr. Gordon A. Riley Institute of Oceanography Dalhousie University Halifax, Nova Scotia	A non-mathematical discussion of mathematical models of ecosystems. What they can do, and do they have a future?
April 1	Dr. Steven M. Stanley The Johns Hopkins University Baltimore, Maryland	The functional morphology and autecology of living and extinct mussels
April 28	Dr. Otto Kinne Biologische Anstalt Helgoland, Germany	Responses to temperature and salinity variations in colonial hydroids





May 20	Dr. Richard C. Dugdale University of Washington Seattle, Washington	Models for the uptake of nitrogen by phytoplankton
May 27	Dr. Dennis Powers Argonne National Laboratory Argonne, Illinois	Structure, function, and molecular ecology of <i>Catostomus clarkii</i> : molecular niche segregation
June 11	Dr. Eugene P. Odum University of Georgia Athens, Georgia	Outwelling: A concept in productivity
June 15	Dr. C. G. Bookhout Duke University Marine Laboratory Beaufort, North Carolina	The effects of the pesticide, mirex, on development of two crabs.
June 17	Dr. William H. Coil Department of Systematics and Ecology University of Kansas Lawrence, Kansas	Embryogeny of dioecious tapeworms
June 22	Mr. Edward G. McCoy, Chief Research and Development Section Division of Commercial and Sports Fisheries Morehead City, North Carolina	Results of shrimp research and management implications

June 24	Dr. Anna Ruth Brummett Department of Biology Oberlin College Oberlin, Ohio	Evidence for every early differentiation in cells of the teleost embryonic shield
June 29	Dr. Ronald Perkins Department of Geology Duke University Durham, North Carolina	Alteration and destruction of marine sediments by micro-boring organisms
July 1	Dr. Audun Fosshagen Biological Station Espesgrend, Blomsterdalen Norway	Hydrographical and biological features of some Norwegian fjords
July 6	Dr. A. R. Cavaliere Department of Biology Gettysburg College Gettysburg, Pennsylvania	Morphology of marine fungi
July 8	Mlle. Genevieve Payen Universite de Paris Faculte des Sciences Paris, France	Androgenic gland and male differentiation decapod crustaceans
July 13	Dr. Llewellya Hillis-Colinvaux College of Biological Sciences Ohio State University Columbus, Ohio	Calcareous green algae of coral reefs
July 15	Dr. Richard Forward Department of Biology Yale University New Haven, Connecticut	Dinoflagellate photaxis: Pigment system and circadian rhythm
July 20	Dr. Frank J. Schwartz Institute of Marine Sciences University of North Carolina Morehead City, N. C.	Cownose rays—world enigmas
July 22	Dr. Pierre Lasserre Institut de Biologie Marine Universite de Bordeaux 33 Arcachon, France	Physiological ecology of meiofauna
July 27	Dr. Jack W. Anderson Institute of Life Science Department of Biology Texas A&M University College Station, Texas	The osmoregulation of the estuarine clam, <i>Rangia cuneata</i> , and the relationship to glycine uptake

July 29	Dr. Michael Salmon Department of Zoology University of Illinois at Urbana Champaign, Illinois	Comparative studies of seduction by fiddler crabs
August 3	Dr. Cleve Hickman Department of Biology Washington & Lee University Lexington, Virginia	Evolution of the vertebrate kidney
August 5	Dr. Gilbert T. Rowe Woods Hole Oceanographic Institution Woods Hole, Massachusetts	The relationship between productivity and benthic biomass
August 5	Dr. Claudia F. Bailey Department of Zoology University of Arkansas Fayetteville, Arkansas	Lipids of the fertilized egg and adult brain of <i>Fundulus heteroclitus</i>
August 10	Dr. Peter Fleischer Duke University Marine Laboratory Beaufort, N. C.	History of the Middle Atlantic continental slope
August 12	Dr. Robert L. Dryfoos Center for Menhaden Research National Marine Fisheries Service, NOAA Beaufort, North Carolina	Menhaden—life and death
August 13	John Croom Emory University Atlanta, Georgia	Slide show of the Antarctic Peninsula
August 17	Dr. Ernest Schoffeniels Universite de Liege Laboratoire de Biochimie Liege, Belgium	Allostery and permeability of cellular membranes
August 19	Dr. Robert D. Barnes Department of Biology Gettysburg, College Gettysburg, Pennsylvania	Biology of mud inhabiting polychaetes



7

Publications

1970

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Appendix

CALENDAR FOR SUMMER SESSION, 1972

Registration at Beaufort—Term II, June 19	Registration at Beaufort—Term III, July 24
Instruction begins—Term II, June 20	Instruction begins—Term III, July 25
Term II ends—July 21	Term III ends—August 25

ADMINISTRATION AND LABORATORY PERSONNEL

Advisory Committee

John D. Costlow, Ph.D., Director Duke University Marine Laboratory	Sigfred A. Linderoth, Jr. Department of Mechanical Engineering
Donald J. Fluke, Ph.D., Chairman Department of Zoology	Orrin H. Pilkey, Ph.D. Department of Geology
John W. Gutknecht, Ph.D. Department of Physiology and Pharmacology	Louis Quin, Ph.D., Chairman Department of Chemistry
R. L. Hill, Ph.D. Department of Biochemistry	Richard B. Searles, Ph.D. Department of Botany

Administrative Staff

Director John D. Costlow Professor of Zoology	Marine Superintendent of Oceanographic Operations John G. Newton
Director of Cooperative Program in Biological Oceanography Richard T. Barber Associate Professor of Zoology and Botany	Assistant Marine Superintendent of Oceanographic Operations Eric Nelson
Business Manager Larry L. Spalding	Master of R/V EASTWARD Ragnvald Sandoy
Maintenance Supervisor Norris Hill	Administrative Assistant Craig Horne

Academic Staff

Summer 1972

*Richard T. Barber, Ph.D. Biological oceanography	*John Gutknecht, Ph.D. Marine membrane physiology
*C. G. Bookhout, Ph.D. Marine invertebrate embryology and invertebrate zoology	Orrin Pilkey, Ph.D. Geological oceanography
*John D. Costlow, Ph.D. Marine invertebrate embryology and experimental zoology	Richard B. Searles, Ph.D. Marine phycology
I. E. Gray, Ph.D., Professor Emeritus Marine ecology and entomology	*J. Bolling Sullivan, Ph.D. Comparative and evolutionary biochemistry
*Richard B. Forward, Ph.D. Physiological ecology of marine animals	*John Sutherland, Ph.D. Marine ecology
	*In residence academic year.

Research Associates

William Bretz, Ph.D.

Duke University Marine Laboratory

The hydrodynamic relationships between sessile and benthic marine organisms and their ambient water currents

Guy Dandrifosse, Ph.D.

Laboratory of Biochemistry

University of Liege

Liege, Belgium

Study of the enzymes secretion by the digestive glands

Unni Fyhn, cand. real.

Institute of Zoophysiology

University of Oslo

Blindern

Oslo 3, Norway

Cement glands in barnacles

Susan Huntsman, Ph.D.

Duke University Marine Laboratory

Phytoplankton nutrition and organometallic complexes in the sea

Charles Johnson, Ph.D.

Duke University Marine Laboratory

Life history studies of protozoan parasites in the blue crab, *Callinectes sapidus*

Mlle. Genevieve Payen

Laboratoire d'Evolution de la Faculte des Sciences de Paris

105, Bd. Raspail

Paris 6, France

Control of sexual differentiation in Crustacea

Visiting Investigators

Andrej Avcin

Marine Biological Station

Portoroz, Yugoslavia

Marit Christiansen

Zoologisk Museum

Universitetet i Oslo

Sarsgt. 1

Oslo 5, Norway

Hans Fyhn, cand. real.

Institute of Medical Genetics

University of Oslo

Blindern

Oslo 3, Norway

Eugene Waldbauer, Ph.D.

Department of Biological Science

State University of New York

Cortland, New York

Reference Museum

Director

I. E. Gray, Ph.D., Professor Emeritus

Curator

William Kirby-Smith, Ph.D.

Graduate Students Engaged in Thesis Research

Gilbert Anderson, B.S.

Department of Zoology

Duke University

Larval development in decapods

Lesley Barling, B.S.

Department of Zoology

Duke University

(NSF Predoctoral Trainee in Biological Oceanography)

Study of sediments and benthic communities as indicators of pesticide accumulation on the continental shelf in the Cape Fear River vicinity off North Carolina

Evelyn Brown, B.S.

Department of Zoology

Duke University

(NSF Predoctoral Trainee in Biological Oceanography)

Relationship of diurnal fluctuations in nutrient concentration to primary productivity in the sea

Robert Dean, B.A.

Department of Zoology

Duke University

Microbiological investigation of marine wood-boring mollusks

Humberto Diaz, Lic. Biol.

Department of Zoology

Duke University

Studies on settlement and recruitment process in the mole crab, *Emerita talpoida*

Jean-Francois Gerard, M.S.

Laboratory of Biochemistry

University of Liege

Liege, Belgium

Cellular volume regulation in the axone of the blue crab, *Callinectes sapidus*

David Haramé, B.S.

Department of Zoology

Duke University

Endocrine mechanisms in barnacle larvae

Paul Hosier,

Department of Botany

Duke University

Maritime influences on the vegetation of Core and Shackleford Banks, North Carolina

Ronald Karlson, B.A.

Department of Zoology

Duke University

Predation on hydroids by the nudibranch, *Cratena pilata*

Sharon Smith, M.A.

Department of Zoology

Duke University

Thermal effects and plankton ecology

Leo Spencer, M.S.

Department of Chemistry

Duke University

Chemical isolation of physiologically active components from marine sponges of North Carolina

Research Technicians

William Davis, M.A.

Marsha Dietz, M.A.

Clarke Edwards, B.S.

Sally Herring

David Hill

Deborah Horton, B.S.

Doris King, B.A.

A. Vijayakumar, M.Sc.

Sandra Woods, Ph.D.

Support Staff

David L. Bunting
Senior Draftsman

Claudia O. Davis
Maid

Clifton Davis
Plumber

Helen Davis
Housekeeper

James Davis
Materials Control Clerk and
Relief Party Chief

Janet A. Ely
Administrative Secretary

Olive C. Godette
Senior Housekeeper

Harold E. Hicks
Electronics Technician

Horace Holland
General Utility Service Man

Ann Marie Hopkins
Clerk Typist

James Hunnings
Custodian of Records and
Relief Master/Mate

Dorothy T. Johnson
Secretary

Mary Fond Jones
Administrative Secretary

Fred Kelly
Oceanographic Party Chief

Estelle G. Merrell
Administrative Secretary

I. Grayden Moore
Carpenter

Ellen Morgan
Clerk Typist

Kathryn Nelson
Secretary

George Newton
Oceanographic Party Chief

Margaret Peoples
Scientific Illustrator

George S. Robinson
Light Equipment Operator

Florence Taylor
Senior Sponsored Programs Clerk

Sophia D. Turnage
Accounting Clerk

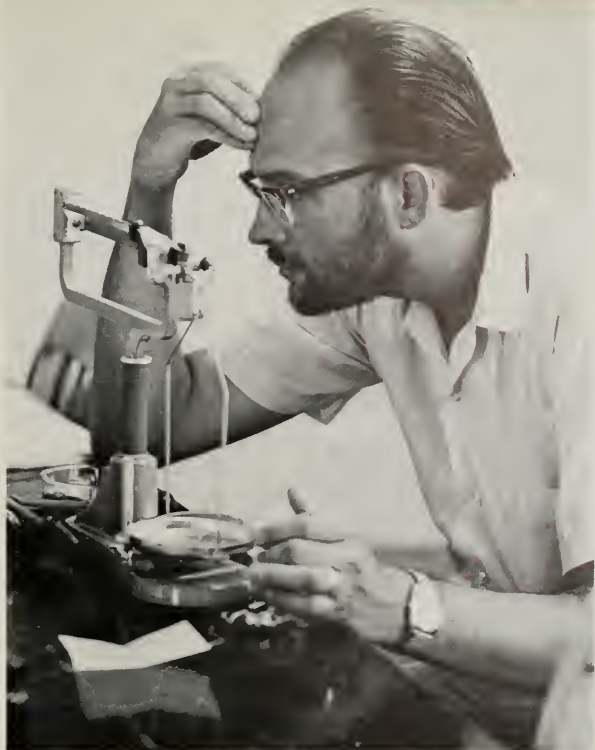
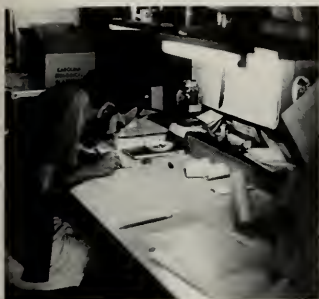
Jean S. Williams
Library Assistant

James L. Willis
Carpenter

R/V EASTWARD Personnel

Ragnvald Sandoy, Master
Harold W. Yeomans, Second Mate
Curtis Nelson, Chief Engineer
William A. Davis, First Assistant Engineer
Harold G. Willis, Second Assistant Engineer
Tennie Davis, Oiler
Clyde R. Everett, Seaman/Messman
Delmas L. Guthrie, Seaman

Edwin Lewis, Seaman
Curtis Oden, Bosun
Benjamin H. Smith, Cook/Messman
Howard L. Wilson, Steward/Cook
Pennel J. Tillett, Seaman
Chester Miller, Relief Mate
James Dixon, Wiper



Niskin bottles (

- (a) chl. ^a + hyst
- (b) P.O. C.
- (c) ¹⁴C (24 hr.)
- (d) nutrients
 - (i) PO_4^{3-}
 - (ii) NH_3
 - (iii) NO_2^-
 - (iv) NO_3^-
 - (v) Silica

Freeze {

APPLICATION FOR ENROLLMENT IN THE DUKE UNIVERSITY SUMMER SESSION

Name.....

Please Print

Date.....

Reserve a place for me in the following course(s): (Only one 6-unit course per term will be permitted; first and second choices may be indicated.) Each applicant should submit a transcript of grades to the Director.

FIRST TERM:

Course Number

Title of Course

.....

.....

SECOND TERM:

Course Number

Title of Course

.....

.....

Fees will be paid by: Self Other

Reserve a room: TERM I TERM II

Attended Summer Sessions at Duke University Marine Laboratory: Yes No.....

Years

Request grade(s) be applied toward:

If college student, list:

Undergraduate credits

Undergraduate Year

Graduate credits

Graduate Year

General (unclassified)

Name and address of School:

If teacher: List name and address of

of school

.....

Married Single

Colleges and/or universities attended and degrees:

Degree

.....

.....

Street Address Rural Route or P. O. Box

Post Office State Zip.....

Signature.....

COURSE INSTRUCTOR'S APPROVAL

Mail to: Director
Duke University Marine Laboratory
Beaufort, North Carolina 28516

APPLICATION FOR ENROLLMENT IN THE DUKE UNIVERSITY SPRING SEMESTER
MARINE SCIENCES PROGRAM FOR UNDERGRADUATES

Please type or print.

Date

1. Name
last first middle

2. Social Security Number Sex: Male Female

3. Date of Birth: Month Day Year

4. A. Current mailing address:

City State ZIP

Area Code Telephone Number

B. Permanent or home address:

City State ZIP

Area Code Telephone Number

5. A. Present marital status: Single Married

If applicable, give number of dependent children

B. Name and address of next of kin:

Name Relationship

Address City State ZIP

Area Code Telephone Number

6. A. Duke University undergraduate student:

Trinity College

Woman's College

Engineering

B. Special student desiring transfer credit:

Name and address of home institution

City State ZIP

C. Major department Class

continued on reverse side

7. The following persons have been requested to mail letters of recommendation to the Director of the Laboratory:

A. Name Position

City State ZIP

Area Code Telephone Number

B. Name Position

City State ZIP

Area Code Telephone Number

8. Transcript(s) will be sent by the following institution(s):

.....
.....
.....

9. Have you ever been placed on probation or suspended or dismissed from any school?

Yes No (If yes, please explain below.)

Mail application to: Director
Duke University Marine Laboratory
Beaufort, North Carolina 28516



BULLETIN OF DUKE UNIVERSITY
Marine Laboratory

Vol. 44 No. 6A January 1972



Bulletin of Duke University 1972

Summer Session



Bulletin of Duke University

Summer Session

1972

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Number 6

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Calendar of the Summer Session

1972

First Term: May 15-June 16
Second Term: June 19-July 21
Third Term: July 24-August 25

May

- 12 Friday —Completion of registration for Term I
- 14 Sunday—Noon, dormitories ready for occupancy
- 15 Monday—First class day except for undergraduate courses in chemistry, geology, and physics
- 20 Saturday—Classes will be held
- 22 Monday—First class day of chemistry, geology, and physics

June

- 3 Saturday—Classes will be held
- 11-16 Sunday-Friday—Basketball Clinic
- 15-16 Thursday and Friday—Final examinations for first term
- 16 Friday—Completion of registration for Term II
- 18-23 Sunday-Friday—Basketball Clinic
- 18 Sunday—Noon, dormitories ready for occupancy
- 19 Monday—First class day for all courses in Term II
- 24 Saturday—Classes will be held
- 25-30 Sunday-Friday—Basketball Clinic
- 26 Monday—Examination for students electing English for a foreign language requirement; room and hours to be announced. Registration for the examination takes place in the Graduate School Office through July 3.

July

- 3-29 Monday-Saturday—Medical Mycology Course
- 15 Saturday—Classes will be held
- 20-21 Thursday and Friday—Final examinations for second term
- 21 Friday—Completion of registration for Term III
- 23 Sunday—Noon, dormitories ready for occupancy
- 24 Monday—First class day for Term III
- 29 Saturday—Classes will be held

August

- 1 Tuesday—Final date for filing with Graduate School Office the Statement of Intention to complete requirements for an advanced degree during the summer session. If a thesis is to be presented, the title is to be filed at the same time as the Statement of Intention.
- 5 Saturday—Classes will be held
- 15 Tuesday—Noon, last day for submitting theses for advanced degrees
- 24-25 Thursday and Friday—Final examinations for third term
- 25 Friday—Final date for completion of requirements for Graduate School degrees to be awarded September 1

Officers of the University Administration

General Administration

Terry Sanford, J.D., LL.D., D.H., L.H.D., D.P.A., *President*
John O. Blackburn, Ph.D., *Chancellor*
Frederic N. Cleaveland, Ph.D., *Provost*
Charles B. Huestis, *Vice President for Business and Finance*
William G. Anlyan, M.D., *Vice President for Health Affairs*
Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*
Gerhard Chester Henricksen, M.A., C.P.A., *Vice President and Treasurer*
Harold W. Lewis, Ph.D., *Vice Provost and Dean of the Faculty*
John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*
James L. Price, Ph.D., *Vice Provost and Dean of Undergraduate Education*
*Craufurd D. Goodwin, Ph.D., *Vice Provost and Director of International Programs*
Thomas F. Keller, Ph.D., *Vice Provost*
Joel L. Fleishman, LL.M., *Vice Chancellor for Public Policy Education and Research; Director of Institute of Policy Sciences and Public Affairs*
Benjamin Edward Powell, Ph.D., *Librarian*
Clark R. Cahow, Ph.D., *University Registrar*
J. Peyton Fuller, A.B., *Controller*
Rufus H. Powell, LL.B., *Secretary of the University*
Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Assistant Treasurer*
Victor A. Bubas, B.S., *Assistant to the President*
A. Kenneth Pye, LL.M., *University Counsel*

*Leave of absence through August, 1972.

Officers of the Summer Session

Olan Lee Petty, Ph.D., *Director of the Summer Session*
Frederick Charles Joerg, M.B.A., *Assistant Provost for Academic Administration*
Hugh M. Hall, Ph.D., *Dean of Trinity College and Assistant Provost*
Leroy P. Smith, S.M., *Assistant Dean of Trinity College*
Stephen C. Frederick, B.D., *Assistant Dean of Trinity College*
Richard Cox, B.D., *Dean of Undergraduate Men*
Alan M. Jenks, Th.D., *Dean of Freshmen and Assistant Dean of Trinity College*
Gerald L. Wilson, M.A., *Assistant Dean of Trinity College*
George W. Pearsall, Sc.D., *Dean of the School of Engineering*
Otto Meier, Jr., Ph.D., *Associate Dean for Undergraduate Study of the School of Engineering*
Juanita M. Kreps, Ph.D., *Dean of The Woman's College and Assistant Provost*
Jane Philpott, Ph.D., *Dean of Instruction, The Woman's College*
Elizabeth Nathans, Ph.D., *Assistant Dean of Instruction, The Woman's College*
Virginia Bryan, Ph.D., *Assistant Dean of The Woman's College*
Paula R. Phillips, A.B., *Dean of Women*
Lillian Armfield Lee, M.S.Ed., *Assistant Dean of Women, The Woman's College*
Ruby Wilson, Ed.D., *Dean of the School of Nursing*
William J. Griffith, A.B., *Dean of Student Affairs and Assistant Provost*
Thomas A. Langford, Ph.D., *Dean of the Divinity School*
Charles William Ralston, Ph.D., *Dean of the School of Forestry*
Charles M. Harman, Ph.D., *Associate Dean of the Graduate School*
Dale B. J. Randall, Ph.D., *Associate Dean of the Graduate School*
Thomas D. Kinney, M.D., *Director of Medical and Allied Education*
John Costlow, Jr., Ph.D., *Director of Duke Marine Laboratory*
Robert H. Ballantyne, Ed.D., *Director of Undergraduate Admission*
James T. Cleland, D.D., *Dean of the Chapel*
Howard Charles Wilkinson, D.D., *Chaplain to the University and Director of Religious Activity*
James Benjamin Smith, M.S.M., *Director of Chapel Music and Choral Music*
Walter Scott Persons, A.B., *Recreation Supervisor for the Summer Session*
Lawrence W. Smith, Jr., B.A., *Director of Housing Management*
Paul R. Benton, *Manager of Residence Halls*

The Summer Session Faculty

Adams, Anne H., Ed.D., *Associate Professor of Education*
Aldrich, Carole Ann, Ph.D., *Assistant Professor of Business Administration*
Alt, A. Tilo, Ph.D., *Assistant Professor of German*
Auld, Louis E., Ph.D., *Assistant Professor of Romance Languages*
Barber, Richard T., Ph.D., *Associate Professor of Zoology*
Bassett, Frank Houston, III, M.D., *Associate Professor of Anatomy*
Beach, Stephen, M.A., *Instructor in Sociology*
Benditt, Theodore M., LL.B., *Instructor in Philosophy*
Bessent, Helga W., M.A., *Assistant Professor of German*
Boatman, Sandra, Ph.D., *Visiting Assistant Professor of Chemistry*
Bonk, James, Ph.D., *Associate Professor of Chemistry*
Bookhout, Cazlyn G., Ph.D., *Professor of Zoology*
Borinski, Ernst, Ph.D., *Visiting Professor of Sociology*
Bowman, Francis Ezra, Ph.D., *Professor of English*
Bradley, David Gilbert, Ph.D., *Professor of Religion*
Braibanti, Ralph, Ph.D., *James B. Duke Professor of Political Science*
Brundage, Dorothy J., M.N., *Assistant Professor of Nursing*
Bryan, Anne-Marie, M.A.T., *Assistant Professor of Romance Languages*
Budd, Louis J., Ph.D., *Professor of English*
Burdick, Donald S., Ph.D., *Associate Professor of Mathematics*
Burford, Walter W., S.T.M., *Assistant Professor of Religion*
Carbone, Peter, Ed.D., *Associate Professor of Education*
Carson, Robert C., Ph.D., *Professor of Psychology*
Cartwright, William H., Ph.D., *Professor of Education*
Cell, John W., Ph.D., *Associate Professor of History*
Chafe, William, Ph.D., *Assistant Professor of History*
Charlesworth, James H., Ph.D., *Assistant Professor of Religion*
Clark, Henry B., Ph.D., *Associate Professor of Religion*
Clum, John M., Ph.D., *Assistant Professor of English*

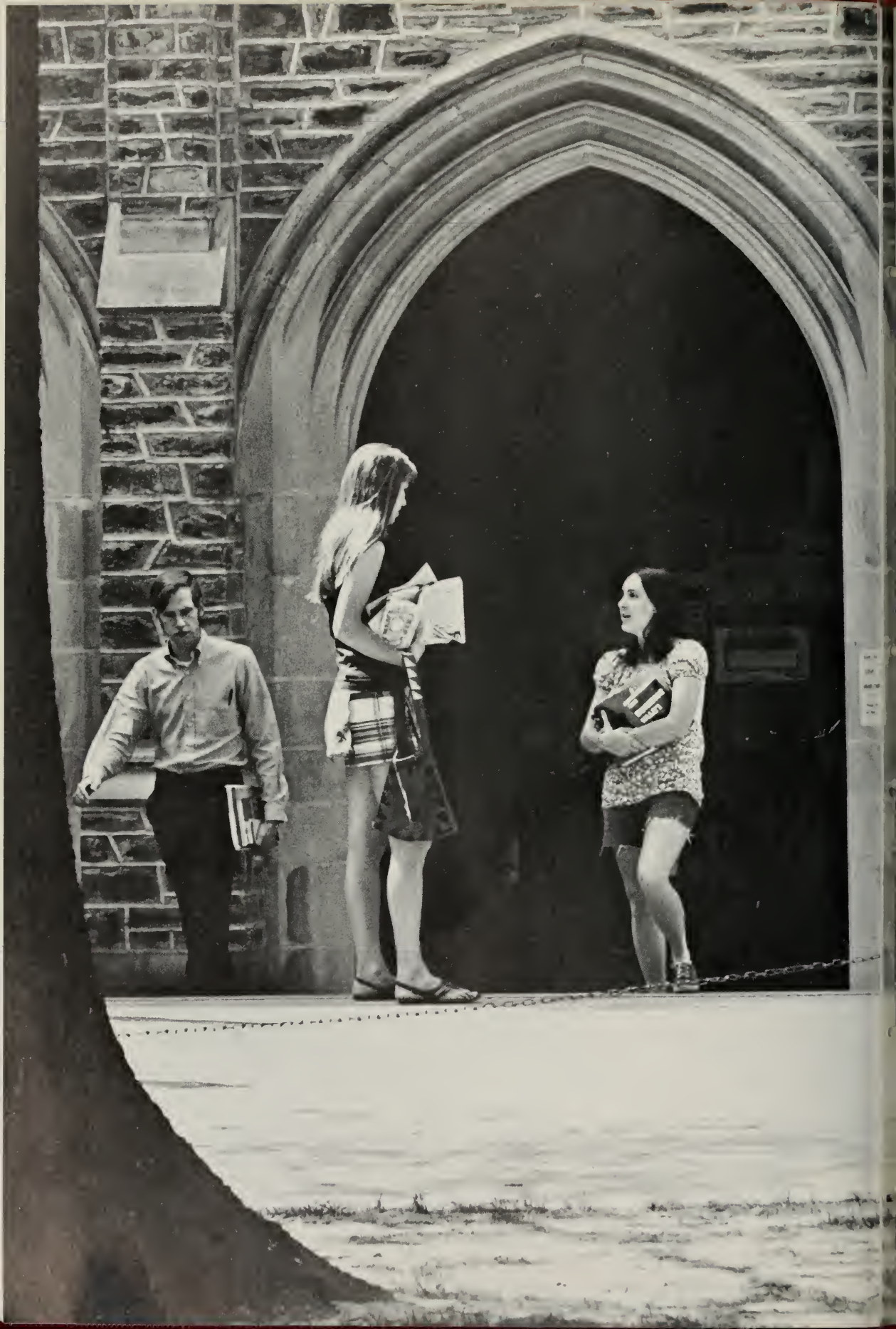




Colton, Joel G., Ph.D., *Professor of History*
 Colver, Robert Merle, Ed.D., *Associate Professor of Education*
 Conant, Norman F., Ph.D., *Professor of Microbiology*
 Corless, Roger J., B.D., *Instructor in Religion*
 Davies, David George, Ph.D., *Professor of Economics*
 Davis, Calvin D., Ph.D., *Associate Professor of History*
 Davis, Lucy T., Ed.D., *Assistant Professor of Education*
 De Neef, A. Leigh, Ph.D., *Assistant Professor of English*
 Dickens, Robert L., LL.D., *Professor of Accounting in the Department of Management Sciences*
 Duffey, Bernard I., Ph.D., *Professor of English*
 Durden, Robert F., Ph.D., *Professor of History*
 Evans, Lawrence E., Ph.D., *Associate Professor of Physics*
 Ferguson, Oliver W., Ph.D., *Professor of English*
 Fish, Peter G., Ph.D., *Assistant Professor of Political Science*
 Fitzgerald, Bruce, M.A., *Instructor in Economics*
 Forward, Richard B., Ph.D., *Assistant Professor of Zoology*
 Friedrich, John A., Ph.D., *Professor of Physical Education*
 Gehman, Ila, Ed.D., *Associate Professor of Medical Psychology*
 Gehman, W. Scott, Jr., Ph.D., *Professor of Psychology in Education*
 Gerber, Gerald E., Ph.D., *Associate Professor of English*
 Githens, Sherwood, Jr., Ph.D., *Professor of Education*
 Graham, Daniel A., Ph.D., *Assistant Professor of Economics*
 Gutknecht, John, Ph.D., *Assistant Professor of Physiology*
 Guttman, Norman, Ph.D., *Professor of Psychology*
 Hagerman, Robert L., Ph.D., *Assistant Professor of Business Administration*
 Han, Moo Young, Ph.D., *Assistant Professor of Physics*
 Hartwig, Gerald W., M.A., *Assistant Professor of History*
 Havrilesky, Thomas, Ph.D., *Associate Professor of Economics*
 Henson, G. Ward III, Ph.D., *Assistant Professor of Mathematics*
 Heron, S. Duncan, Jr., Ph.D., *Professor of Geology*
 Herr, David G., Ph.D., *Assistant Professor of Mathematics*

Higgins, Robert, Ph.D., *Visiting Assistant Professor of History*
 Hodel, Richard E., Ph.D., *Associate Professor of Mathematics*
 Huber, Peter, M.A., *Instructor in Anthropology*
 Huntington, Richard, M.A., *Instructor in Anthropology*
 Hurlburt, Allan S., Ph.D., *Professor of Education*
 Jackson, Wallace, Ph.D., *Associate Professor of English*
 Jacobansky, Ann Madeline, M.Ed., *Professor of Nursing*
 Johns, Sheridan Waite, III, Ph.D., *Associate Professor of Political Science*
 Johnson, Charles B., Ed.D., *Associate Professor of Education*
 Johnson, Terry Walter, Ph.D., *Professor of Botany*
 Jones, Buford, Ph.D., *Associate Professor of English*
 Kalat, James, Ph.D., *Assistant Professor of Psychology*
 Kalke, William C., M.A., *Assistant Professor of Philosophy*
 Katzenmeyer, William G., Ed.D., *Associate Professor of Education*
 Klables, Gunter, B.A., *Temporary Instructor in German*
 Kremen, Irwin, Ph.D., *Assistant Professor of Psychology*
 Kuhn, Arthur J., M.B.A., *Assistant Professor of Business Administration*
 Lakin, Martin, Ph.D., *Professor of Psychology*
 Landeira, Richard, Ph.D., *Assistant Professor of Romance Languages*
 Leach, Richard H., Ph.D., *Professor of Political Science*
 Lerner, Warren, Ph.D., *Associate Professor of History*
 Lutz, Peter L., Ph.D., *Temporary Assistant Professor of Zoology*
 Lynts, George W., Ph.D., *Associate Professor of Geology*
 Maier, Steven F., Ph.D., *Assistant Professor of Business Administration*
 Markman, Sidney David, Ph.D., *Professor of Art History and Archaeology*
 Martin, David V., Ed.D., *Associate Professor of Education*
 McCollough, Thomas E., Th.D., *Associate Professor of Religion*
 Meyers, Eric M., Ph.D., *Assistant Professor of Religion*
 Moore, Lawrence C., Jr., Ph.D., *Assistant Professor of Mathematics*
 Murray, James C., Ph.D., *Assistant Professor of Romance Languages*
 Novak, Richey A., Ph.D., *Assistant Professor of German*
 Nygard, Holger Olaf, Ph.D., *Professor of English*
 Oates, John F., Ph.D., *Associate Professor of Classical Studies*
 Parker, Harold Talbot, Ph.D., *Professor of History*
 Patrick, Merrell Lee, Ph.D., *Associate Professor of Mathematics*
 Phillips, James Henry, Ph.D., *Professor of Religion*
 Pilkey, Orrin H., Ph.D., *Associate Professor of Geology*
 Pittillo, Robert A., Ed.D., *Associate Professor of Education*
 Price, James L., Ph.D., *Professor of Religion*
 Reiss, Edmund A., Ph.D., *Professor of English*
 Riebel, John D., M.A., *Assistant Professor of Physical Education*
 Roberts, George, Ph.D., *Associate Professor of Philosophy*
 Salinger, Herman, Ph.D., *Professor of German*
 Sanford, David, Ph.D., *Associate Professor of Philosophy*
 Searles, Richard B., Ph.D., *Associate Professor of Botany*
 Shuman, R. Baird, Ph.D., *Professor of Education*
 Silberman, Bernard S., Ph.D., *Professor of History*
 Smith, David Alexander, Ph.D., *Associate Professor of Mathematics*
 Smith, Donald S., M.H.A., *Assistant Professor of Hospital Administration*
 Smith, Grover C., Ph.D., *Professor of English*
 Spragens, Thomas, Ph.D., *Assistant Professor of Political Science*
 Stanley, D. Keith, Jr., Ph.D., *Associate Professor of Classical Studies*
 Steegar, David, M.A., *Instructor in Romance Languages*
 Stern, Henry R., Ph.D., *Assistant Professor of German*
 Stevenson, Lionel, Ph.D., *James B. Duke Professor of English*
 Sublett, Henry L., Jr., Ed.D., *Associate Professor of Education*
 Sullivan, James B., III, Ph.D., *Assistant Professor of Biochemistry*
 Sutherland, John, Ph.D., *Assistant Professor of Zoology*
 Tetel, Marcel, Ph.D., *Professor of Romance Languages*
 Troy, Joan, M.A., *Instructor in Education*
 Turner, Arlin, Ph.D., *Professor of English*
 Ward, Calvin L., Ph.D., *Associate Professor of Zoology*
 Wardropper, Bruce W., Ph.D., *William H. Wannamaker Professor of Romance Languages*

Warner, Seth L., Ph.D., *Professor of Mathematics*
Wells, Richard L., Ph.D., *Associate Professor of Chemistry*
White, Cary, M.A., *Instructor in Sociology*
White, Charles W., Ph.D., *Assistant Professor of Psychology*
White, Suzanne, B.S., *Instructor in Physical Education*
Wilder, Pelham, Jr., Ph.D., *Professor of Chemistry*
Wilkinson, William E., B.S., *Assistant Professor of Mathematics*
Willis, William Hailey, Ph.D., *Professor of Greek*
Wilson, John, Ph.D., *Assistant Professor of Sociology*
Winther, Jean, Ph.D., *Visiting Lecturer in Anthropology*
Winther, Paul, M.A., *Instructor in Anthropology*
Wolfe, James F., Ph.D., *Visiting Associate Professor of Chemistry*
Wong, Kai-Tak, Ph.D., *Assistant Professor of Mathematics*
Wortman, Paul M., Ph.D., *Assistant Professor of Psychology*
Yohe, William P., Ph.D., *Professor of Economics*



General Information

The Summer Program at Duke

The summer session at Duke University makes available to Duke students, to students from other universities and colleges, to teachers in elementary and secondary schools, and to other special students a notable program of instruction in many fields of knowledge, both academic and professional.

Course programs offered during the summer are designed to meet special and particular needs as well as the more conventional requirements leading to specific degrees.

Postdoctoral research scholars may find the regular summer session courses useful for further study. The library facilities and the various laboratories may be valuable for postdoctoral residents.

Graduate students who have been admitted to the Graduate School to study for the Master of Arts, Master of Education, and Master of Arts in Teaching degrees will find courses arranged in sequence from summer to summer to meet their requirements.

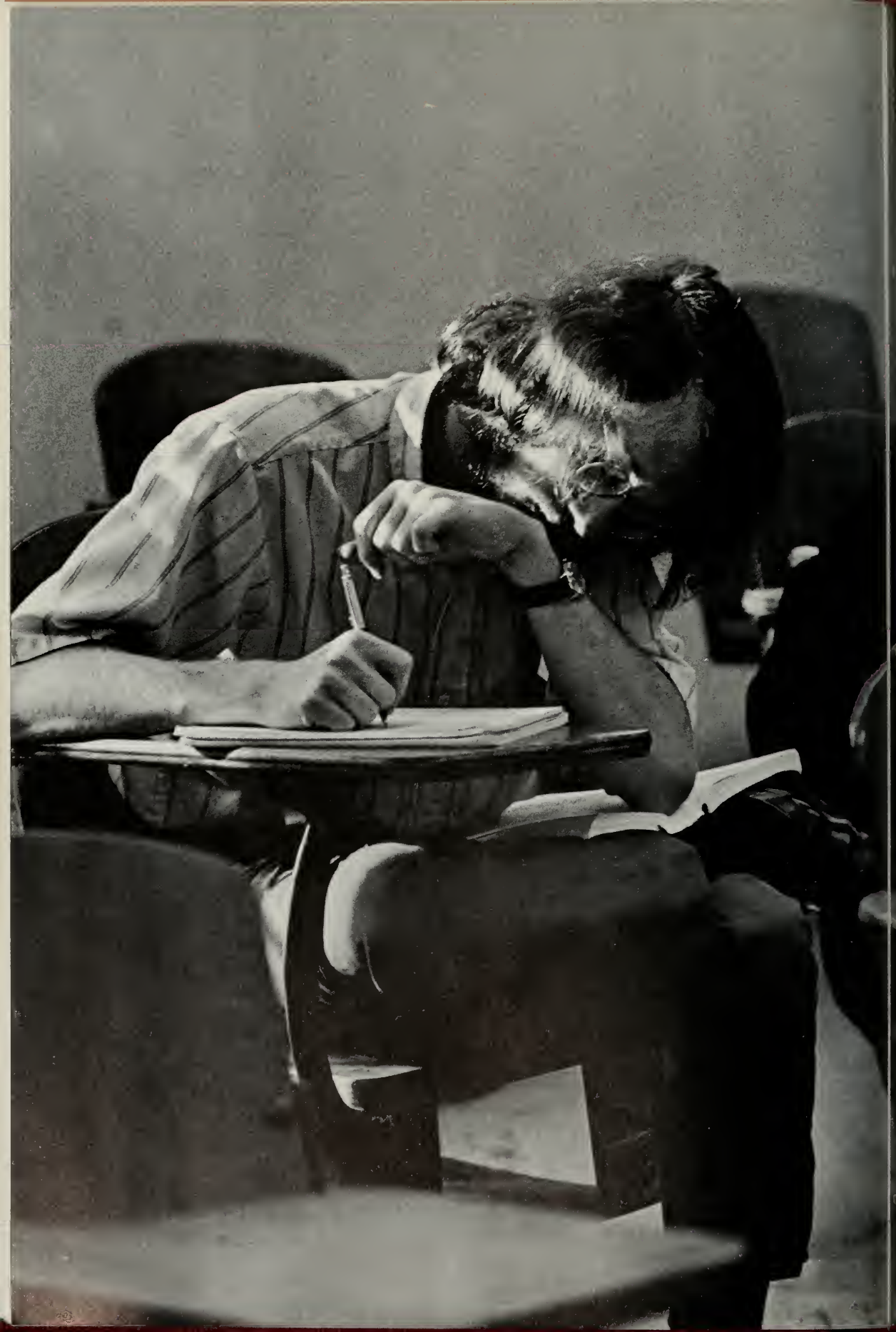
Teachers from elementary and secondary schools who desire to earn credits toward the renewal of their certificates and who are interested in further teacher training in subject content and method may enroll in senior-graduate courses as special or unclassified students.

Undergraduates of Duke University who desire to accelerate their programs may complete the work for a degree in three years by attending two or more summer sessions.

Undergraduates from other colleges and universities may enjoy the special advantages of summer instruction at Duke and transfer credits earned to their own institutions.

Although the summer course program meets, in many departments, the needs of degree candidates, it goes beyond these limits in also presenting courses of wide general interest and, in addition, special non-credit lectures, conferences, institutes, and workshops.

Duke University's ample and modern research facilities will be available during the summer to all properly qualified students. It is the hope of the University, of the summer faculty, and of the administrative officers that former students and new students will find increasing values in each summer spent at Duke.



2

Program Information

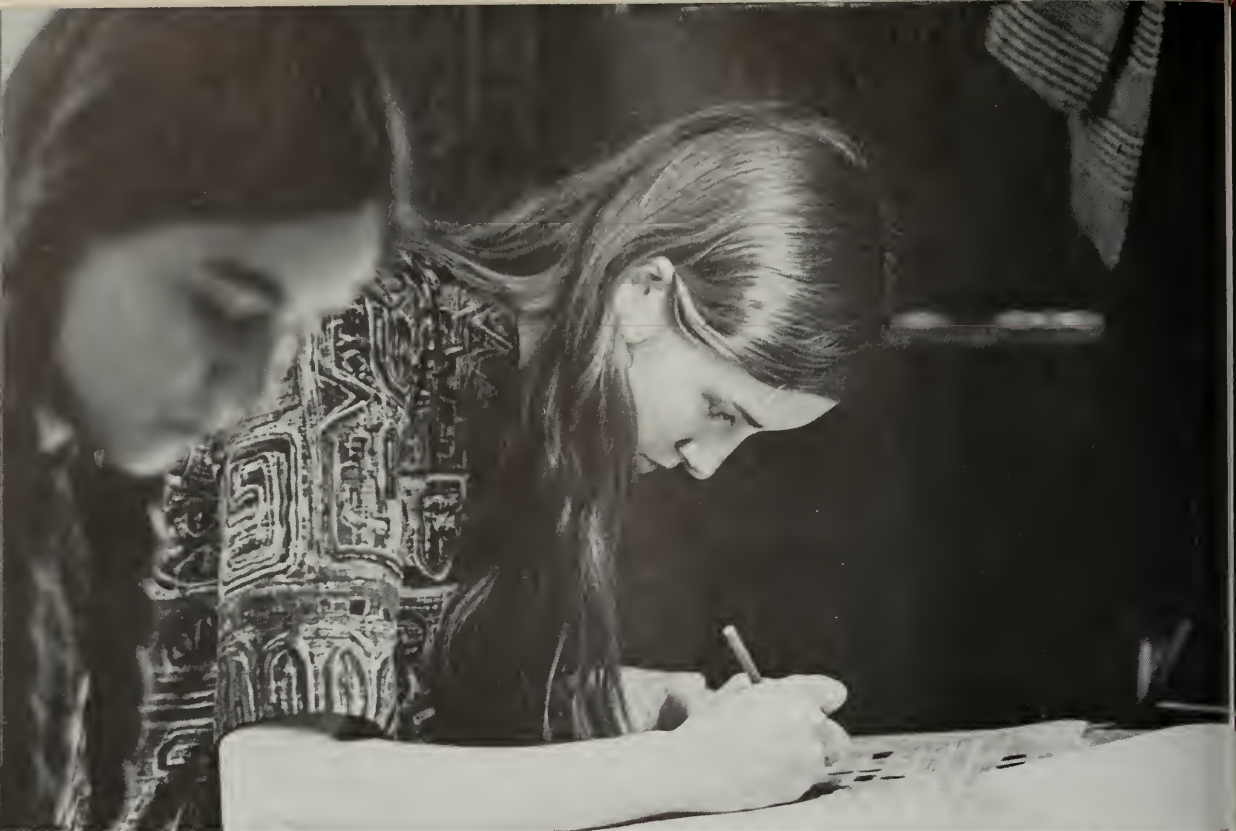
Undergraduate Study

Students in the undergraduate colleges of Duke University who desire to enrich or accelerate their academic study will find summer programs to meet their individual needs and interests. Special courses are provided which are not otherwise available to undergraduates; election of the usual courses may relieve an overload during the fall or spring terms; and, summer programs also enable some students to attain provisional graduate status in the senior year or to graduate in less than four years.

By attending at least two terms of the summer session, it is possible for a student to earn credit for as many as four semester-courses. Instruction will be offered in the summer of 1972 in most departments and colleges. Specific requirements for degrees offered in the undergraduate colleges and schools may be obtained from the *Bulletin of Undergraduate Instruction*.

Graduate Study

Degrees and Requirements. The Graduate School of Duke University now offers the following degrees: Master of Arts (A.M.), Master of Science (M.S.), Master of Education (M.Ed.), Master of Arts in Teaching (M.A.T.), Master of Hospital Administration (M.H.A.), Master of Business Administration (M.B.A.), Doctor of Philosophy (Ph.D.), and Doctor of Education (Ed.D.). Specific requirements relative to admission, residence, major and related studies, languages, and thesis requirements may be obtained from the *Bulletin of the Graduate School*.



Candidates for degrees in the Graduate School desiring to have their degrees conferred on September 1 must have completed all requirements for the degree as of the final day of the Duke University summer session. A candidate completing degree requirements after that date will have his degree officially conferred at the following June Graduation Exercises. (Transfer of credit for work completed at other universities must be recorded by September 15.)

Summer Program for Graduates. Summer sessions offer an excellent opportunity to advance or complete programs of graduate study already undertaken, to begin study toward a graduate degree at Duke University, to acquire graduate training useful in professional advancement, or to study for personal satisfaction. The several departments offer a variety of graduate courses, as listed in later pages, given by members of the Duke faculty and visiting professors.

Unclassified Graduate Students. Any student who holds an A.B. or B.S. degree and who does not intend to earn an advanced degree at Duke University but who desires graduate work for professional or other reasons should apply to the Director of the Summer Session for admission as an unclassified student. Credits earned by an unclassified graduate student in graduate courses taken at Duke before his admission to the Graduate School may be carried over into a graduate degree program if (1) the action is recommended by the student's director of graduate studies and approved by the Dean, (2) the work is not more than two years old, (3) the amount of such credit does not exceed six units, and (4) the work is of G level or better. This policy shall be effective with students entering the Graduate School in September, 1971.

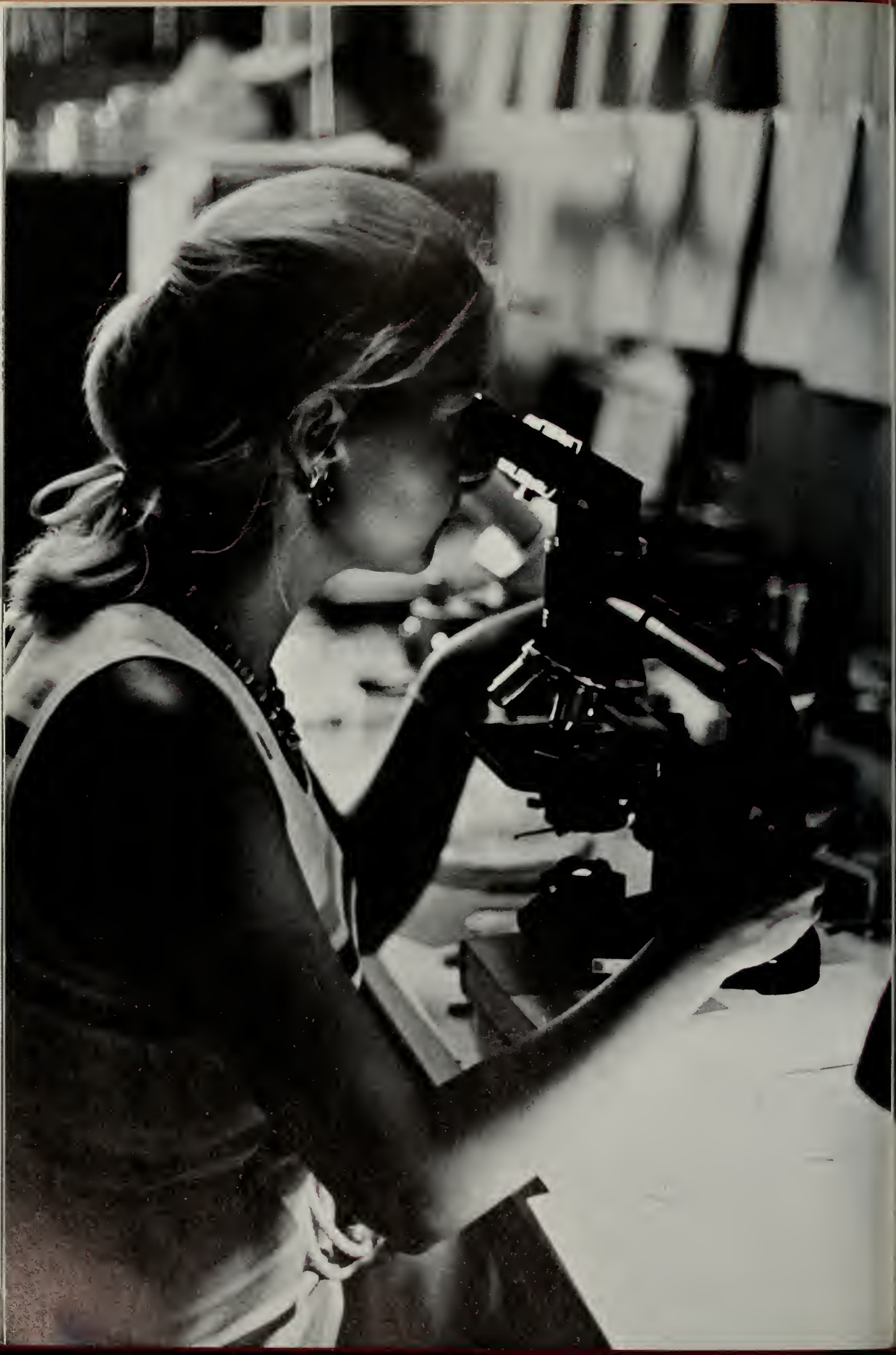
Cooperative Program in Teacher Education. Thirty-five to forty selected graduates of liberal arts colleges who desire to prepare for high school teaching will be admitted to a special internship program at Duke University. This program is designed to prepare for a teaching career selected college graduates who did not prepare professionally for teacher certification as undergraduates. The cooperative program provides, for candidates who are chosen, graduate study in their special fields, professional courses, and carefully supervised observation and teaching experiences. One who completes the program successfully can achieve, within a period of fifteen months, a year of teaching experience, a Master of Arts in Teaching degree, and full certification as a teacher.

Candidates will begin the program at the opening of Term II of the 1972 Summer Session and complete it in August 1973. They will spend two terms of the summer preceding and the summer following the year of teaching in residence at the University. During the school year 1972-73 interns will be employed as regular teachers in cooperating public school systems. During this year they will receive full salary and will work under the joint supervision of the cooperating public school and the University. The program will meet training qualifications for the advanced or graduate teacher's certificate in many states. Participants in the program are expected to teach for a second year as fully certified teachers in the school in which they complete the internship.

The salary for the year of teaching will, in effect, constitute a substantial award to candidates selected for the program. Interns will benefit from Duke University's special tuition rate for teachers. Applicants will be considered, as are candidates for other awards, on a competitive basis. The best qualified applicants will be chosen on the basis of undergraduate record, recommendations, and evidence of interest in becoming high-school teachers. Applicants are required to arrange interviews in connection with their applications. Application forms may be requested from the Dean of the Graduate School and should be submitted before February 15, 1972. Details concerning the program can be obtained by writing the Director, Cooperative Program in Teacher Education, Department of Education, Duke University.

Postdoctoral Research

Scholars engaged in postdoctoral research find it advantageous and sometimes essential to use the resources of the Duke University libraries during the summer. The University welcomes these visitors and makes living accommodations (dormitory space and dining facilities) available to them during the summer sessions from May 15 to August 25.



3

Special and Cooperative Programs

Cooperative Program

The long standing reciprocal agreement between Duke and the University of North Carolina is now effective for the summer sessions at both universities. To take advantage of this arrangement for either term of the summer session, the eligible student registers each term for three units of credit at the home institution and three units representing the course to be taken at the other institution, for a total of six units. A nominal registration fee of \$2 will be charged at the other institution. Credit so earned is not defined as transfer credit. This program applies to both graduate and undergraduate students.

Special Conferences and Courses

Special Programs for Teachers of Science and Mathematics. It is anticipated that the summer session will offer a number of special programs at the graduate level designed specifically for high school teachers of science and mathematics. For detailed information on the programs, teachers should write Dr. Sherwood Githens, Education Department, Duke University, Durham, North Carolina 27706.

Highlands Biological Station. Duke University holds a subscribing instructional membership in the Highlands Biological Station at Highlands, North Carolina, on the southern edge of the Blue Ridge Mountains at an elevation of 4,118 feet. The situation and the region offer an excellent opportunity for field studies and some laboratory work. A limited number of qualified students in botany and zoology may make arrangements to carry out research at this station.



Medical Mycology. A month's course in medical mycology, under the direction of Dr. Norman F. Conant, is to be offered through the Duke Medical Center from July 3-29, 1972. The course will be offered every day in the week, except Sunday, and has been designed to ensure a working knowledge of the human pathogenic fungi within the time allotted.

Emphasis will be placed on the practical aspects of the laboratory as an aid in helping establish a diagnosis of fungus infection. Insofar as possible and as patients become available, methods of collecting materials in the clinic for study and culture will be stressed. Work with patients, clinical material, cultures, and laboratory animals will serve as a basis for this course. Also, an opportunity to study pathologic material, gross and microscopic, will be given to those students whose previous training would allow them to obtain the greatest benefit from a study of such material.

The enrollment for the course will be limited and the applications will be considered in the order in which they are received. An attempt will be made, however, to select students on the basis of their previous training and their stated need for this type of work.

A fee of \$200.00 will be charged for this course, upon the completion of which a certificate will be awarded. However, an applicant upon acceptance into the course may register with the Summer School, pay its fees instead of the fee

stated above, and receive four units of graduate credit for the course. Please direct all inquiries to Dr. Norman F. Conant, Professor of Microbiology, Duke University Medical School, Durham, North Carolina 27706.

The United Methodist Course of Study School. The twenty-fourth session of the short-term school for Methodist ministers taking the required course of study will be conducted during the period, July 4-28, 1972 (Independence Day will be celebrated on Monday July 3). Although this school is designed primarily for supply pastors and other non-seminary candidates for the United Methodist ministry, clergymen of any denomination may enroll. The curriculum as approved by the 1968 United Methodist General Conference will be followed and will include studies for license to preach, introductory studies, and the studies for the first, second, third, and fourth years, as well as advanced studies.

In addition to class work, there is provision for daily worship and a number of special lectures and workshops. A varied program of recreation and athletics will be supervised by the Duke Department of Physical Education.

Registration is scheduled for July 4. Classes begin on the evening of July 4 and continue through July 28. A descriptive folder giving details of the school will be ready for distribution about December 1, 1971, and copies may be procured by writing to Professor Paul A. Mickey, Director, Box 4484, Duke Station, Durham, North Carolina 27706.

Divinity School Summer Clinics. Summer Clinics in several fields such as, pastoral care, preaching, theology, parish planning, and campus ministry are tentatively scheduled for July 31 to August 11, 1972. These clinics are designed to supplement seminary education through two weeks of intensive training in one selected subject. Registration is open to ministers of all denominations. Participants are expected to attend the full two weeks from the opening dinner to the closing luncheon. Each clinic has its own leaders and schedule. No academic credit is given. Please address request for information to Summer Clinics, The Divinity School, Duke University, Durham, North Carolina 27706.



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Resources for Study

Libraries

The William R. Perkins Library consists of the new research library building which was opened early in 1969 and the old building, which was renovated in 1970. The complex has about 2,100 seats, 700 of which are in private carrels, and shelf space for 2,500,000 volumes.

On June 30, 1971, the university libraries, including nine schools and six departmental collections, contained 2,231,519 volumes and more than 4,100,000 manuscripts. One hundred and four thousand volumes were added during the year and 13,798 periodicals are received regularly. Many rare and perishable materials which appeared in books, newspapers, periodicals, and manuscripts are available in microtext form and may be read in a special microtext reading room in the Perkins Library. Rare books and manuscripts have special quarters in the building, which are accessible to all members of the University community.

All libraries of the University are open for use throughout the summer. Guides to the Perkins Library for faculty, graduate students, and undergraduate students are available upon request to the University Librarian, Perkins Library, Duke University, Durham, North Carolina 27706.

Laboratories

The laboratories in the various science departments (Botany, Chemistry, Physics, Psychology, and Zoology) are designed for both teaching and research. Ideal locations for special work in some of the sciences are available at Duke University Marine Laboratory at Beaufort, North Carolina; at Highlands Biological Laboratory at Highlands, North Carolina; in the Duke Forest at Durham, North Carolina; and in the Sarah P. Duke Gardens on the West Campus of Duke University.



5

Student Life

Living Accommodations

Housing. To provide maximum comfort and pleasant surroundings, the air conditioned residence hall facilities in Few and Edens Quadrangles on West Campus are used to house most summer session students. Houses in Few Quadrangle are reserved for regularly enrolled graduate and undergraduate women and undergraduate men. Graduate men may be assigned to Edens if necessary. Accommodations in the University's Town House Apartments, located about one mile from the center of the campus, may also be obtained for graduate students and some married couples or families consisting of no more than four persons. Town House units will not be available for any period less than one summer term.

Residence hall accommodations are not available for married couples or families. Students with families may seek assistance in obtaining off-campus housing by contacting the Manager of Apartments and Property, Department of Housing Management, Duke University, Durham, N. C. 27706.

Undergraduates, both men and women, are required to live in the residence halls unless they are married or living with parents or relatives or have received permission to reside off campus for the previous or subsequent academic year. Any exception must be approved in advance by the Dean of Women or the Dean of Undergraduate Men.

The majority of residence hall rooms at Duke University are double rooms furnished for two persons. The limited number of single rooms are assigned in order of receipt of application with the required rental payment at the Department of Housing Management. No double room may be reserved for single occupancy.

Furnishings—Few and Edens Quadrangles. Each student will be provided with a glide-out bed with spread, desk with chair, dresser, mirror, wastebasket, and adequate closet space. Each student should provide a desk lamp, sheets, blanket, pillow, and other items desired. Beds measure 80 inches by 30 inches.

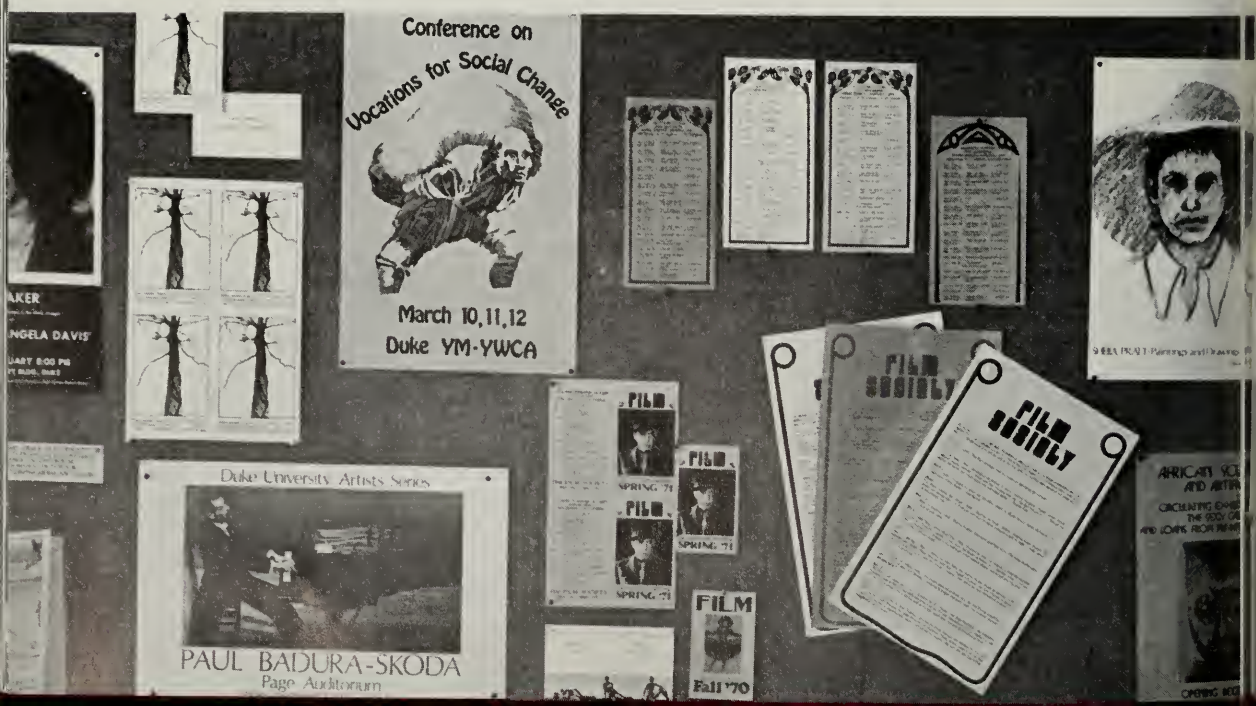
Furnishings—Town House Apartments. Each attractive apartment is equipped for three persons and includes living room, kitchen, master bedroom (for two students) with half bath, a single bedroom (one student), and a master bath with tub and shower. Housekeeping supplies, kitchenware, and linens must be provided by the occupants.

Dining Service. Food service is cafeteria style. The cost of meals runs from \$2.50 to \$3.00 per day, depending on the needs and tastes of the individual. Only the dining facilities on the West Campus will be used for the regular summer session students. The cafeteria in the Men's Graduate Center is usually not open in the summer.

Duke University Marine Laboratory. The Duke University Marine Laboratory, located on Pivers Islands, has cottage-type residence halls which will be available for summer session students. Further information may be obtained from the *Bulletin of the Duke University Marine Laboratory*.

Services Available

Medical Care. The Student Health Service, in the Marshall Pickens Rehabilitation Center, operates during the summer session and offers exactly the same medical and surgical services available to each full-time student during the academic year, as described completely in the *Bulletin of Information and Regulations*, but covers only six days of hospitalization in each term of summer session residence.





With the exceptions noted below, this service, under the direction of the University physician and with the cooperation of the staff of Duke Hospital, furnishes full medical and surgical care, drugs, dressings, X-ray work, and ward, but not special, nursing for any acute illness or injury at no additional cost beyond the University fee for each term of residence or for any shorter period. The cost of blood, braces, and necessary orthopaedic appliances must be borne by the student. A charge for meals will be made while the student is in the hospital. The student must pay all necessary telephone and telegraph charges. If students have insurance providing hospitalization, surgical, or medical benefits, these benefits shall be applied to the cost of their medical care. Refraction of eyes, treatment of teeth, and of all chronic and pre-existing conditions such as diseased tonsils, hernias, elective surgery, chronic skin conditions, endocrine disturbances, or accidents or illness occurring during vacation or while off campus are not included in this service.

No illness is treated in dormitory or other rooms occupied by students. Students needing treatment for minor medical or surgical conditions have the facilities of the Student Health Office in the Pickens Building between 9:00 a.m. and 4:00 p.m. on weekdays and from 9:00 a.m. until 12:00 noon on Saturdays. Emergency room care is available on Saturday afternoons, Sundays, and the July 4 holiday. For admission to the hospital, or for X-ray and consultation services, a student must present the 1972 Summer Session Student Identification Card as evidence that he is matriculated in the summer session and entitled to hospitalization. Students who register for one non-laboratory course or for at least one unit of research are entitled to medical care without charge.

The University Counseling Center. The University maintains a University Counseling Center which provides a centralized program of educational, vocational, and personal counseling for students. This confidential counseling service on problems of personal, social, educational, and vocational adjustment is provided without cost to students enrolled at the University. In addition, the center administers special group testing programs for University schools and departments and serves as the local testing center for a wide variety of national testing programs. The center also carries on programs of research in the field of measurement and counseling. Although the counseling, testing, and research services of the center are designed primarily to meet the needs of the students, faculty, and staff of Duke University, these services are made available to individuals and organizations outside the University as its facilities permit. Requests for further information should be addressed to the Director, University Counseling Center, 309 Flowers, Duke University, Durham, North Carolina 27706.

Office of Placement Services. Duke University maintains an Office of Placement Services which acts as a liaison between the University and potential employers in business, education, and government. All services are offered without charge to students in the summer session who are registered for a degree at Duke University. The staff is available to talk with summer session students about their professional plans and with school officials who may be seeking the services of new teachers. Students who are eligible to register with the office are offered an opportunity to assemble a complete dossier of academic records and recom-



recommendations to supplement applications for positions and to have a permanent file for future reference. Pertinent recommendations are far easier to accumulate during the time a student is enrolled at Duke. Copies of academic records are released only with the permission of the individual.

Student Activities

Religious Life. Christian services of worship are conducted in the University Chapel every Sunday of the year, including those which fall during the summer. The hour of the service is eleven o'clock. Preachers representing all branches of Christendom appear in the pulpit, and they are drawn from every quarter of the globe. Choral music for these services is provided by a choir composed chiefly of student volunteers.

Recreation and Activities. The summer session will provide a varied program of entertainment and recreation. The program includes movies, dances, and open house socials. Tours to areas of interest can be arranged for weekends. Both the mountains and the seashore are easily accessible. Adequate facilities are available for those interested in swimming, tennis, and other sports. Clubs organized for the summer play an active part in all social activities and recreation.

Publications

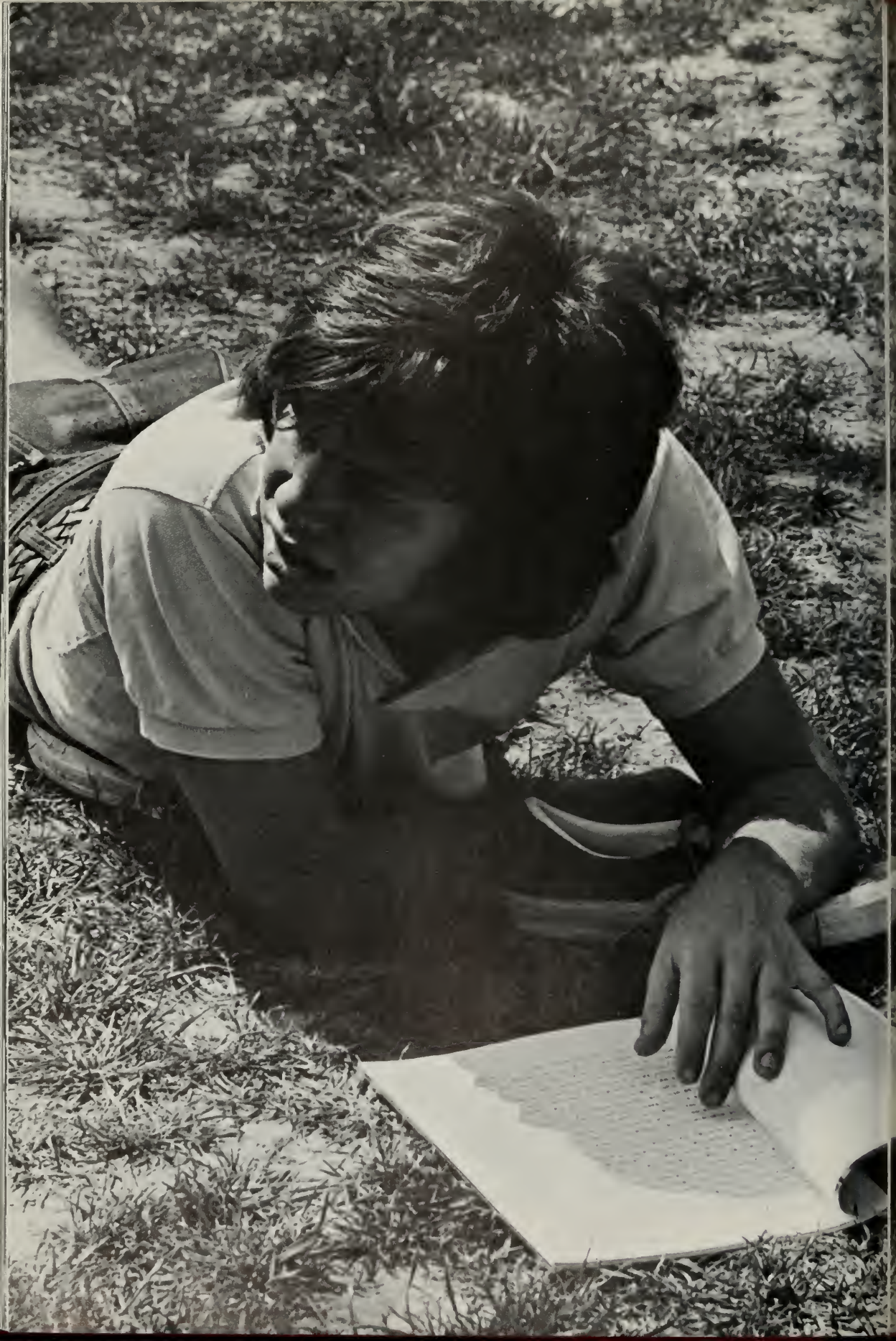
During the summer session the University will publish each Saturday *The Duke University Calendar*, an official calendar announcing events—academic, social, and recreational—of the following week. This calendar also includes official notices concerning academic requirements. Students are expected therefore to read the *Calendar* regularly.

Conduct of Students

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University. The student is expected to be familiar with the current *Bulletin of Information and Regulations* as well as any published regulations for the summer session.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University. University authorities will take action in accordance with academic due process.



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Admission

Qualifications for Admission

Students in the following categories may be admitted to the Duke University Summer Session:

1. Graduates and undergraduates who are presently enrolled and in good standing in Duke University.
2. Graduates and undergraduates who have been formally admitted or re-admitted, to Duke University.
3. Students who are currently in good standing at their respective institution and who have approval by the proper authority to take and transfer credits earned in the Duke Summer Session.
4. Teachers in service with or without the bachelor's degree who wish to earn credits for certification purposes.

Admission to specific courses offered in the summer session is governed by the student's academic status (freshman, sophomore, junior, senior, graduate, special, or unclassified) and by the prerequisites of the course in question. All applicants will be considered without regard to race, color, religion, sex, or national origin.

Application Procedures

Duke Students in Residence during the Spring Semester, 1972. A Duke University student, either graduate or undergraduate, who plans to attend the summer session should at the time of preregistration for the fall semester (see page iv for specific dates) enroll for the desired summer session courses. He need not file with the Summer Session Office the application blank at the end of this *Bulletin*.

Undergraduates Not in Residence at Duke during the Spring Semester, 1972. New students seeking to enter Duke University as freshmen or as undergraduates with advanced standing, and undergraduates who wish to re-enter the University, should write the Office of Admissions requesting application forms.

Undergraduates, both men and women, enrolled in other colleges and universities who desire to earn in the Duke University Summer Session credits which are to be transferred to their own institutions should apply directly to the Director of the Summer Session, Duke University, on the application form at the end of this *Bulletin*. They should give accurately and clearly all information called for on the application form.

Graduates Not in Residence at Duke during the Spring Semester, 1972. Students who are seeking admission to the Graduate School and those who have been admitted to the Graduate School must apply to the Director of the Summer Session on the application form at the end of this *Bulletin*. Those who are seeking admission to the Graduate School *must also file* Graduate School application forms which may be secured by writing to the Dean of the Graduate School, Duke University, Durham, North Carolina 27706.

Students with graduate standing and currently employed as teachers who wish only to earn credits toward renewal or the advancement of their certificate may enroll in the summer session as unclassified graduate students without becoming candidates for a degree at Duke University. Credits earned by unclassified graduate students in graduate courses at Duke may later be counted toward an advanced degree at Duke if the conditions stated on page 4 are met. All students in the unclassified category should apply to the Director of the Summer Session for admission. The application at the end of this *Bulletin* may be used.

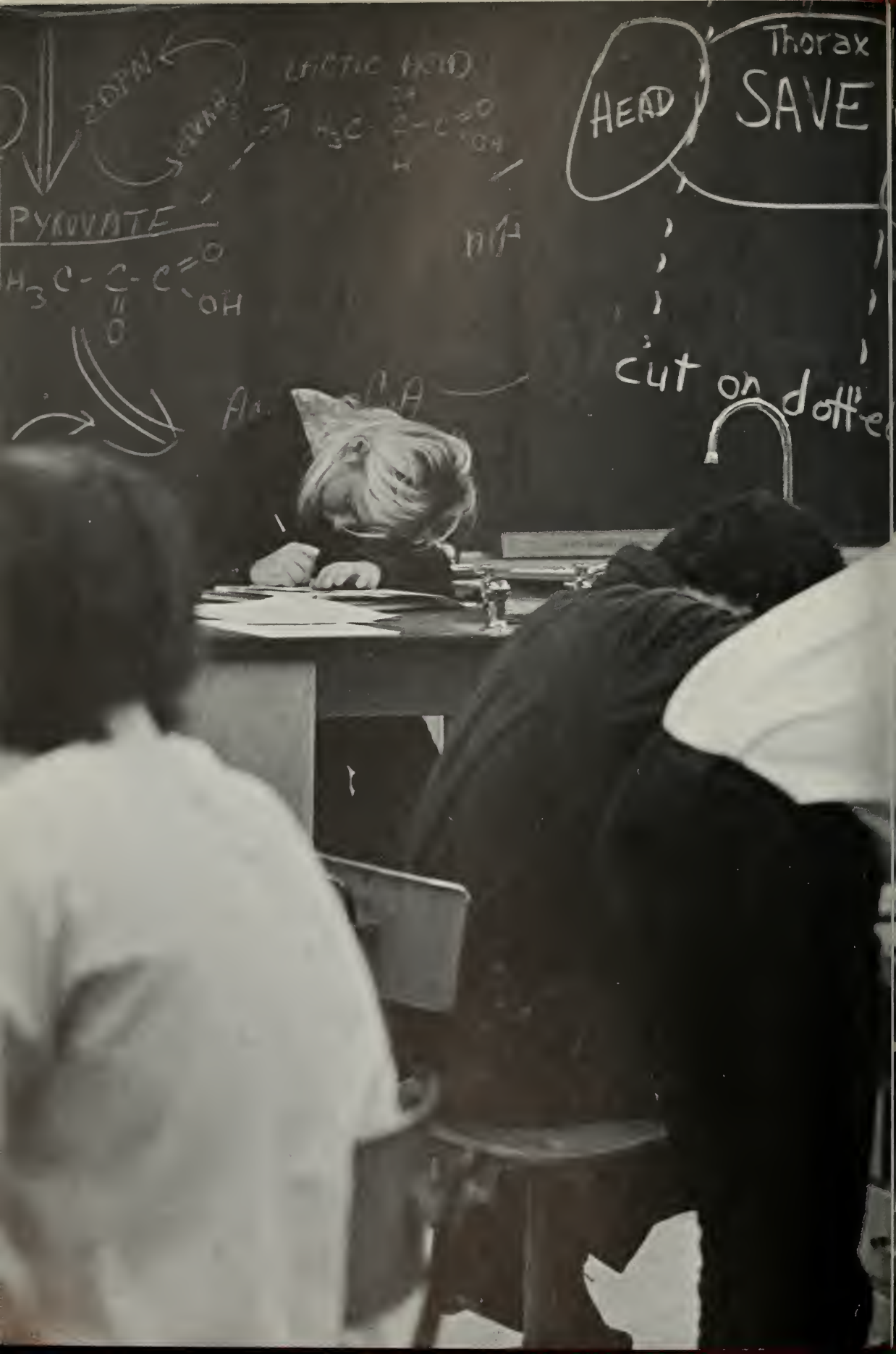


Postdoctoral Scholars. Application for these postdoctoral research privileges must be made in advance by letter to the Director of the Summer Session giving the applicant's present position, the specific field of his research interest, and the dates during which he desires to be in residence. Approved applicants will be accepted subject to the availability of library and dormitory space.

Admission to Degree Candidacy

Undergraduates. A student seeking to enroll as a candidate for the bachelor's degree from one of the colleges of Duke University must meet the entrance requirements set forth in the *Bulletin of Undergraduate Instruction* and be accepted by the Director of Admissions. This *Bulletin* may be secured by writing the Office of Admissions, Duke University.

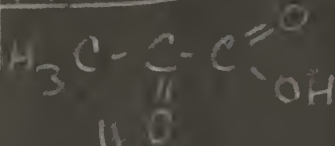
Graduates. A student seeking to enroll as a candidate for one of the advanced degrees offered by the Graduate School of Duke University must meet the requirements set forth in the *Bulletin of the Graduate School*. This *Bulletin* may be secured by writing to the Office of the Graduate School, Duke University.



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Financial Information

Tuition and Fees

The University Tuition. The following charges will cover registration and medical care:

1. Tuition for undergraduates—\$180.00 for each nonlaboratory course; \$240.00 for each undergraduate laboratory course; and \$360.00 for each two-course program offered at the Duke Marine Laboratory.
2. Tuition for graduates—\$60.00 per unit; for an undergraduate course, the tuition rate is indicated in 1 above.
3. Teachers in full-time service in elementary and secondary schools, except teachers pursuing a doctoral program at Duke—one-half of the tuition charges specified in 1 and 2 above.
4. All students pursuing a doctoral program (post-master's) at Duke—fees as specified in 1 and 2.
5. Divinity School students approved by the Dean of that School—one-half of the tuition charge specified in 1 and 2 above, when the course is a requirement for the student's program.

Laboratory Fees. For Marine Laboratory investigators' research table fee, see the *Marine Laboratory Bulletin*.

Medical Mycology Fee. This fee of \$200.00 replaces the University tuition.

Master's Degree Summer Session Tuition. A master's candidate who submits his thesis when not registered for at least 2 units of research-residence tuition is required to pay the 2 unit tuition of \$120.00.

Auditing Fees. These fees are as follows:

1. Students registered for a full course program may audit nonlaboratory courses (with the permission of the Director) at no extra charge.
2. Students carrying less than a full course program may be granted permission to audit a course but he will pay half the University fee for the course.

Late Registration Fee. Students who fail to register prior to the first class day of a given course will pay an extra fee of \$10.00.

Fee for Course Changes. Course changes other than those required by the University will be made only on payment of an extra fee of \$1.00 per change.

Fee for Make-up Final Examination. This fee is \$5.00.

Refund for Tuition and Fees. Tuition and fees will be refunded under the following circumstances:

1. When applications for withdrawal are received by the Director of the Summer Session on or before the Friday preceding the Monday on which classes begin for a given term of the summer session, full tuition and fees will be refunded.
2. When applications for withdrawal are received by the Director of the Summer Session during the first four class days of a given term, 80 percent of the tuition and fees will be refunded.



- When applications for withdrawal are received by the Director of the Summer Session after the fourth class day, there will be no refund of tuition and fees.

Debts. No records are released and no student is considered by the faculty as a candidate for graduation until he has settled with the Bursar for all indebtedness.

Living Accommodations

UNDERGRADUATE AND GRADUATE RESIDENCE HALLS

Few and Edens Quadrangles

Single	Double
15 weeks—\$292.50	15 weeks—\$217.50
10 weeks—\$195.00	10 weeks—\$145.00
9 weeks—\$175.50	9 weeks—\$130.50
8 weeks—\$156.00	8 weeks—\$116.00
5 weeks—\$ 97.50	5 weeks—\$ 72.50
4 weeks—\$ 78.00	4 weeks—\$ 58.00
1 week —\$ 19.50	1 week —\$ 14.50

TOWN HOUSE APARTMENTS (GRADUATE STUDENTS)*

\$20.00 each student per week (three to an apartment).

\$30.00 each student per week (two to an apartment).

*Not assigned for less than four weeks. Air-conditioned. Special rates will be quoted for families. A \$50 residential deposit is required of families occupying Town House Apartments.

DUKE UNIVERSITY MARINE LABORATORY

Each Term, Per Person

Double Room (Non-Air-conditioned)	\$57.00
Double Room (Air-conditioned)	\$72.00
Triple Room (Air-conditioned)	\$52.00

Housing Procedures. Application for room or apartment reservations at Duke University, accompanied by the full amount of the room rent for the application period should be made to Department of Housing Management, Duke University, Duke Station, Durham, North Carolina 27706. Rooms and spaces in apartments will be reserved in order in which applications are received and on certification of admission by the Director of Summer Session. Notification of assignment to rooms will be made about April 15 for the first term, about June 1 for the second term and about July 7 for the third term.

Rooms and apartments are available to applicants at noon on the Sunday before the first day of classes for each summer term. A room or apartment must be vacated by the occupant before 5 p.m. on the last day of the final examination period for each session or on the final day of the agreement period, as appropriate. Any period of occupancy, other than for a specific term of the summer session, must be arranged with the Department of Housing Management, House D, Room 101-R, Duke University.

Refund of Rent. Refunds are made under the following circumstances:

1. When notification for a housing cancellation is received by Department of Housing Management on or before twenty (20) days prior to the first day of scheduled classes of summer session term, full room rent will be refunded.
2. When notification for a housing cancellation is received between the twenty (20) days prior to the first day of scheduled classes and the first four class days, 80 percent of the room rent will be refunded.
3. When notification for a housing cancellation is received after the first four days of a summer session term, 70 percent of the room rent for the unused period will be refunded.

If a preference of roommate is desired, this information should be shown on the application form. If no preference of roommate is expressed, the Department of Housing Management will assign a roommate.

Detailed information pertaining to administration of living facilities at the Duke University Marine Laboratory may be found in the *Bulletin of the Marine Laboratory*.

Estimated Cost of One Term of the Summer Session

University tuition, two nonlaboratory courses or 6 graduate units.....	\$360.00*
Dormitory Rooms (Double room for five weeks).....	72.50
Meals (Cafeteria selective; average per day, \$2.50).....	90.00†
Books and class materials (Average).....	18.50†
Miscellaneous (Laundry, etc.).....	12.00†
Total	\$553.00

*Teachers, elementary and secondary, in full-time service (except teachers pursuing a doctoral program at Duke) pay \$180.00.

†Approximate costs which will vary according to individual tastes and needs.

Student Aid

Special Tuition Rate to Teachers. Teachers in full-time service in elementary and secondary schools, except those who are pursuing a doctoral program at Duke, pay only one-half of the regular tuition charge. Teachers on leave of absence from their schools and teachers not currently employed are not eligible for this special fee.

Scholarships for Public School Personnel. Duke University will offer 27 special scholarships of \$200.00 each to high school and elementary teachers on a competitive basis (not by a written examination) for the summer session of 1972. This scholarship program is designed to encourage teachers to begin or to continue their graduate studies leading to the A.M., M.Ed., or M.A.T. degree.

Duke University will again offer five special scholarships of \$225.00 each to high school and elementary administrators and supervisors. This scholarship program is designed to encourage principals and supervisors to continue their graduate studies leading to advanced degrees.

Although successful applicants for the scholarships will not be required to become candidates for a degree, they must qualify for and receive admission to the Graduate School.

All applications with supporting documents must be submitted by April 1, 1972. Selection and appointment of scholars will be completed by May 1, 1972.

Application blanks and complete information may be obtained from the Director of the Summer Session, Duke University, Durham, North Carolina 27706.

Loans. A number of loan funds have been established for the benefit of the students of Duke University. Several of these funds are available to students enrolled in the summer session. Students enrolled in the summer session *only* are not eligible. These funds are administered through a committee of officers of the University.

The committee, in approving loans, selects those students who, from the standpoint of character, scholastic attainment, and degree of financial need, are deserving of consideration.

Applicants for loans should make application to the Manager, Student Loan Office, Duke University. All applications must be initiated during the first week of each term. The granting or withholding of a loan is a matter entirely within the discretion of the Student Loan Committee. A student is expected to use all other possible means of securing financial assistance before applying for aid from a loan fund.

National Defense Education Act Loans. A limited number of loans may be made, under the provisions of the National Defense Education Act of 1958, to students in the summer session who have been regularly enrolled in the University prior to the summer session. A student who is enrolled for study in the summer session *only* is not eligible for consideration. Students pursuing the M.A.T. Cooperative Program are not eligible. Inquiries concerning opportunities available under this program for this benefit should be made to the Manager, Student Loan Office, Duke University, Durham, North Carolina 27706.

Remission of Tuition. Children of Methodist ministers who are members of the North Carolina and Western North Carolina Conferences of the United Methodist Church are entitled to a remission of the tuition charge as are the children of fulltime ministers of all faiths serving churches in Durham County, North Carolina. This consideration is given only to the children of resident members of the two North Carolina conferences who are giving their full time to religious work. Only those students enrolled in a regular undergraduate program leading to a baccalaureate degree from the University are entitled to this benefit. Students in this group are entitled to a maximum of eight semesters of free tuition at the undergraduate level. Application for this benefit should be made to the Director of Undergraduate Financial Aid, Duke University, Durham, North Carolina 27706.

Tuition Grants. Tuition grants are available to children of faculty and qualified staff members of Duke University. Information regarding the tuition grant program may be obtained by writing to the Director of Undergraduate Financial Aid, Duke University.



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Registration and Regulations

Definition of Terms

Registration. A student has completed registration for the summer session when:

1. His course program has been written and approved by the dean of the school or college in which he is enrolled or by the Director of the Summer Session in the case of the special or unclassified student.
2. Summer session forms have been completed properly by the student in the Summer Session Office.
3. Summer session University fees have been paid. A place in a course cannot be assured until fees have been paid. Tuition bills are not sent to the student's home.

Pre-enrollment. The term *pre-enrollment* refers only to the writing of the course program and its approval by the proper authority or by the Director of the Summer Session in the case of the special or unclassified student. Pre-enrollment alone does not constitute registration.

General Registration

In each of the three terms of the 1972 Summer Session, classes will begin on a Monday: Term I, Monday, May 15; Term II, Monday, June 19; and Term III, Monday, July 24. A student attending a given summer session term must complete his registration in the Summer Session Office, 119 Allen Building, on or before the

Friday preceding the first class day of that given term: Term I, Friday, May 12; Term II, Friday, June 16; and Term III, Friday, July 21.

A student in classes beginning on dates other than the beginning date of each of the three terms must complete his registration in the Summer Session Office before the date on which those classes begin.

Late Registration

Any student who fails to register on or before the dates specified in the preceding paragraphs will be charged a fee of \$10 for late registration. All late registrations and course changes must be completed by the end of the third class day of each term (May 17, Term I; June 21, Term II; and July 26, Term III). All course changes must be approved by the dean of the school or college in which the student is enrolled, or, in the case of the special or unclassified student, by the Director of the Summer Session.

Since summer session courses present a program of study in more concentrated and rapid form than in the regular semesters, students are advised to register on time and to be present at all class sessions.

Advanced Registration

Students in Residence during the Spring Semester, 1972. Students in residence at Duke University during the spring semester, 1972, both graduate and undergraduate, who plan to enroll for courses or research in one or more terms of the 1972 Summer Session will write course programs and have them approved in their respective schools or colleges during the week of preregistration, April 3-6, 1972.

Graduate and undergraduate students in residence, whose course programs have been written and approved by their respective schools or colleges on the dates indicated above, may complete their registration in the Summer Session Office, 119 Allen Building, by paying their tuition from May 1-12.

A Duke student, graduate or undergraduate, who desires to attend the summer session but did not preregister on April 3-6 should complete his registration by the Friday preceding the beginning of the term he wishes to attend.

Students Not in Residence at Duke during the Spring Semester, 1972. Students not in residence at Duke University during the spring semester, 1972—new undergraduate students seeking to enter as degree candidates, graduate students who are not candidates for an advanced degree at Duke University, graduate and undergraduate students of other colleges and universities desiring to earn credits for transfer, public school teachers, and college teachers (not advanced degree candidates)—may register by mail. Advance registration by mail includes:

1. Completion in full of the application form at the end of this *Bulletin*.
2. Admission to the summer session by the Director of the Summer Session and, in the case of a student seeking to enter Duke University as a degree candidate, admission by the admission director to the school or college of Duke University concerned.



3. Completion in full and return of forms required by the Summer Session Office at least one week prior to the beginning of the term involved.

4. Payment of tuition by at least one week prior to the beginning of classes.

Students who have not completed their registration by mail for courses in a given term should complete their registration in the Summer Session Office, 119 Allen Building, on the Friday previous to the first class day of that given term.

Degree-Candidate Graduate Students Not in Residence during the Spring Semester, 1972. A graduate student not in residence during the spring semester 1972, who is a candidate for an advanced degree in the Graduate School of Duke University, may complete his registration by mail if his director of graduate studies and the Graduate School Office approve the registration. The student will follow the same four steps given above. Any graduate student unable to complete registration by mail must present himself for registration in the Summer Session Office on May 12 for Term I, June 16 for Term II, and July 21 for Term III.

Registration of Graduate Students. Graduate students in residence during the spring semester will preregister for one or more terms of the summer session on April 3-6. Newly admitted graduate students who have not completed their registration by mail should present themselves for registration at the official registration periods. All graduate students are required to register both with the Summer Session Office and with the Graduate School Office.

Graduate students resident in the spring semester who intend to remain in residence during one or more of the three summer session terms without registering for course work or at least 2 units of research must register for 2 units to cover the cost of medical care and the use of University facilities. These units of registration will entitle students to use the Student Health Service and University's facilities during the three terms of the summer session. The master's candidate who has completed all requirements except submission of the thesis and who so registers is not charged any separate fee for submitting the thesis, but he is required to register for 2 units.

Graduates Not in Residence at Duke during the Spring Semester, 1972.

Students who are seeking admission to the Graduate School and those who have been admitted to the Graduate School must apply to the Director of the Summer Session on the application form at the end of this *Bulletin*. Those who are seeking admission to the Graduate School must also file Graduate School application forms which may be secured by writing to the Dean of Graduate School, Duke University, Durham, North Carolina 27706.

Students with graduate standing and currently employed as teachers who wish only to earn credits toward renewal or the advancement of their certificate may enroll in the summer session as unclassified graduate students without becoming candidates for a degree at Duke University. Credits earned by unclassified graduate students in graduate courses at Duke may later be counted toward an advanced degree at Duke if the conditions stated on page 4 are met. All students in the unclassified category should apply to the Director of the Summer Session for admission. The application form at the end of this *Bulletin* may be used.

Academic Regulations

Types of Course Enrollment. Summer Session courses may be taken for credit or may be audited. A student's program may be exclusively in one of these categories, or may combine the two of them. Students taking a full or partial program for credit may enroll as auditors in any number of additional courses.

The summer session term *credit* does not mean degree credit at Duke University unless the student has been admitted as a degree candidate by one of the colleges or schools of the University. A student taking a course for credit is expected to do all the work required and to take the final examination, and he will receive a grade. G.I. Bill benefits are available only to those veterans who enroll for credit.

An auditor is entitled to listen to lectures and class discussions, but he may not participate in discussions or take examinations. A student carrying a full program for credit may be given permission to audit as many courses as he desires without additional fees. Students carrying less than a full program for credit may

secure permission to audit but are required to pay the auditing fee, which is half the regular fee.

Credits. The summer session courses are of the same quality and credit values as courses in the regular semester. Credit earned in the summer session is in terms of courses or units. The majority of summer session courses carry one course or three graduate units of credit and require one term in residence.

A student desiring either graduate or undergraduate credits transferred from Duke University to his university or college as degree credit must request from the Director of the Summer Session, Duke University, a Course Approval Form to be completed by the student's dean or registrar and returned to the Director of the Summer Session.

Under certain circumstances a maximum credit of 6 units in a master's degree program may be allowed for graduate courses completed elsewhere. Approval for the transfer of credits will not be given until the student has spent one semester or two terms in residence. The acceptance of credit up to this amount will not reduce the minimum period of full-time registered residence at Duke University. In no case will credit be allowed for extension or correspondence courses.

With the approval of both the student's major department and the Dean of the Graduate School, a student who is granted such transfer for credit may be permitted to register for as much as 12 units for thesis research instead of the usual 6 units. Or he may be permitted to fill out his schedule with as much as 6 units of further undergraduate training or 6 units of required language courses on the undergraduate level.

For regulations concerning the application of graduate credit earned elsewhere to a graduate program here, consult the *Bulletin of the Graduate School*.

See page 7 for information concerning reciprocal agreement with the University of North Carolina.

Professional credits toward teacher's certificates are granted by the various state boards of education, each in accordance with its own carefully planned rules. Teachers in service, before enrolling for certification credit, should consult the rules laid down by their State Board of Education. If necessary, they should send to their State Board of Education a list of the courses in which they plan to enroll and inquire whether these will be acceptable for certification credit.

Maximum Course Program. The maximum program for one term of the summer session is two courses.

Grading. Only a student taking a course for credit will receive a grade. The grade given represents the quality of the work done in the course.

Passed. The following are passing grades for undergraduates and graduates:

Undergraduate Grades

A—excellent

B—good

C—average

Graduate Grades

E—exceptional

G—good

S—satisfactory

Failed. A grade of *F* indicates that the student has failed the course, and in order to receive credit for the course he must repeat the work in class.

Incomplete. A grade of *I* may be reported by the instructor if for any reason he is unable to report the final grade at the regular time. Incomplete courses must be completed before the close of the succeeding semester; otherwise the *I* is recorded as *F*, and the course must be repeated in class if the student is to receive credit for it.

Absent from Final Examination. The grade of *X* indicates that the student was absent from the regularly scheduled examination. A student absent from examination, if the absence has been excused by the dean of the college or school in which he is enrolled or, in the case of the special or unclassified student, by the Director of the Summer Session, may receive an examination upon the payment of \$5 to the Bursar of the University. The instructor concerned arranges for the examination in cases where absences are excused. A student with an *X* grade who has not obtained a passing grade before the end of the semester following that in which the *X* was incurred is regarded as having failed in the course concerned and must repeat the work in class in order to receive credit. If a student's absence from an examination is not excused by the dean of the college or school in which he is enrolled or, in the case of the special or unclassified student, by the Director of the Summer Session, his grade for the course concerned is recorded as *F*.

Pass-Fail Option. With the consent of the instructor and faculty adviser, a student who has declared a major may choose to be graded on a pass/fail basis in one elective, non-major course each semester. In addition, with the consent of the instructor, adviser, and director of undergraduate studies a student may take for pass/fail credit courses in independent study or internship in any department including that of his major. Certain internships and small group experiences will be offered only on a pass/fail basis.

A student enrolling in a course on a pass/fail basis completes all the work of the course but receives either a pass (*P*) or fail (*U*) grade in lieu of a standard grade. After the first week of classes in any semester, no student may change his status to or from a pass/fail basis. A pass grade may not subsequently be converted to a regular letter grade nor may the course be retaken on a regular credit basis.

For the effect of the election of the pass/fail option in determining honors, consult the *Bulletin of Undergraduate Instruction*.

Examinations. Final examinations in courses are held on the last two days of each term. Final examinations for short courses will be held on the last day of the course. The examination dates for the first term are June 15-16, second term July 20-21, and third term August 24-25.

Courses in science for the first term have been scheduled so that their final examination will come on July 15. The science courses which begin on July 19 and run for four weeks will have their final examination on August 13. The University has no provision for giving examinations *in absentia*. Students absent from examinations for valid reasons are permitted a liberal extension of time to return to the University for the completion of credit.

Continuation Requirements. A student must achieve a satisfactory record

of performance during the Summer Session in order to maintain his enrollment at Duke. He may be dismissed temporarily or permanently by the dean of his college or the Director of the Summer Session for failure to make satisfactory progress.

Dropping of Courses. If a student drops a course without permission from the dean of the school or college in which he is enrolled or, in the case of the special or unclassified student, the Director of the Summer Session, the grade for that course is recorded as *F*. If he drops a course with permission, the grade for that course is *F* unless, in the judgment of the dean or director, circumstances do not justify this penalty.

Withdrawal from the Summer Session. If a student wishes to withdraw from the summer session, he must notify both the dean of the school or college in which he is registered and the Director of the Summer Session.

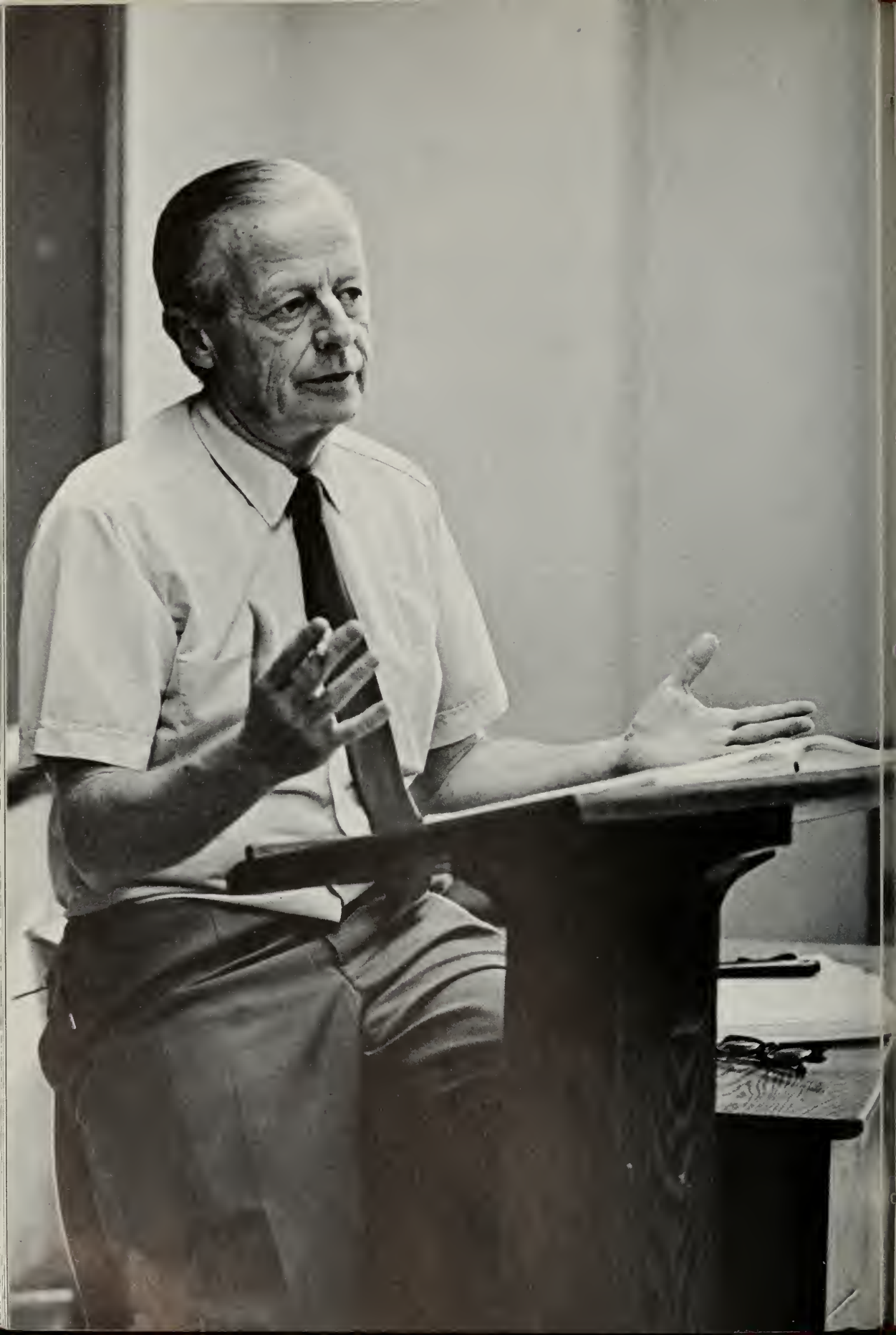
Motor Vehicle Regulation

Students enrolled in the summer session must register their motor vehicles with the Traffic Office, 2010 Campus Drive, West Campus.

To register a vehicle, the student must present the following documents: (1) state vehicle registration certificate; (2) valid driver's license; and (3) satisfactory evidence of automobile liability insurance as required by North Carolina law—\$10,000 per person, \$20,000 per accident for personal injuries, and \$5,000 property damage.

Parking, traffic, and safety regulations will be given each student who registers his vehicle. Students are expected to abide by these regulations.





9

Courses of Instruction

Course Enrollment

Eligibility. Courses numbered 1-49 are primarily for freshmen, or freshmen and sophomores. Courses numbered 50-99 are ordinarily for sophomores, or sophomores and juniors. Courses numbered 100-199 are designed for juniors and seniors. Courses numbered 200-299 are planned for seniors and graduates. Courses numbered 300 up admit graduate students only. Courses numbered from 200 up are limited in enrollment to 25 students.

Minimum Enrollment Required. All courses are offered subject to minimum enrollments. The University reserves the right to withdraw undergraduate courses in which fewer than twelve students enroll, senior-graduate courses numbered 200-299 in which fewer than ten students enroll, and graduate courses and seminars numbered 300 or above in which fewer than six students enroll. In withdrawing a course, the University attempts to avoid undue hardships on students. Sometimes, therefore, courses are offered in spite of small enrollments. Courses not listed will be given when a demand develops and an instructor is available.

Department Officers and Regulations

Departments offering summer session programs are listed alphabetically. Under each department is given the name of the chairman, of the director of graduate studies, and of the director of undergraduate studies. Where departments have set up special regulations for admission to candidacy for the master's degree, these are included.

Summer Session Schedule of Classes

Summer session classes will meet Monday through Friday each week, except classes will be held on Saturday, May 20 and June 3 during Term I; on Saturday, June 24 and July 15 during Term II; and on Saturday July 29 and August 5 during Term III. The other Saturdays during each term are available for conferences or class work.

Class periods are as follows:

First period—8:00 a.m.-9:20 a.m.

Second period—9:40 a.m.-11:00 a.m.

Third period—11:20 a.m.-12:40 p.m.

Fourth period—1:20 p.m.-2:40 p.m.

Anatomy

Professor J. David Robertson, *Chairman* (401 Davison, West Campus); Professor John Buettner-Janusch, *Director of Graduate Studies* (100 Medical Research, West Campus)

First Term

151. Anatomy of the Lower Extremities as it Relates to Locomotion. Dissection of the human lower extremity. Demonstration and discussion of gait, biomechanics, and kinesiology, 9:40-11:00. One course. *Bassett*

Art

Professor Dario A. Covi, *Chairman* (211 Art Building, East Campus); Associate Professor Marianna Jenkins, *Director of Undergraduate Studies* (203 Art Building, East Campus)

First Term

66. Introduction to Modern Art. Development of architecture, sculpture and painting in Europe and America from about 1750 to the present. 8:00-9:20. One course. *Markman*

Biochemistry

Professor Robert Hill, *Chairman* (225 Medical Sciences Building); Professor Kenneth McCarty, *Director of Graduate Studies* (Medical Sciences Building)

First Term (Durham Campus)

208. Laboratory Methods in Biochemistry. An advanced laboratory course that emphasizes current procedures, instrumentation, and experiments. Each student selects from a number of experiments of a wide range of classical investi-

gations that illustrate significant biochemical progress. Hours to be arranged. One course (3 graduate units). *Staff*

Second Term (Duke Marine Laboratory, Beaufort)

276. Comparative and Evolutionary Biochemistry. (Also Zoology 276.) Lectures and discussion of the origin of life, evolution of the genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Techniques used include salt fractionation, electrophoresis, ion-exchange and molecular exclusion chromatography, fingerprinting, molecular weight determination, amino acid composition, and other related approaches. Prerequisite: consent of the instructor. Two courses (6 graduate units). *Sullivan*

Botany

Professor Robert L. Wilbur, *Chairman* (147 Biological Sciences Building, West Campus); Associate Professor Boyd R. Strain, *Director of Graduate Studies* (136 Biological Sciences Building, West Campus); Associate Professor Richard A. White, *Director of Undergraduate Studies* (371 Biological Sciences Building, West Campus)

Students admitted to candidacy for an advanced degree in botany should have completed a minimum of 12 semester hours of courses in botany (or biology) beyond an elementary course, and related work in biological sciences. Students who have not yet had the minimum hours, however, may enter higher courses by permission of the instructor, if he is convinced that they can carry the work for undergraduate credit, and may count such work toward hours necessary for candidacy.

First Term (Durham Campus)

103. General Bacteriology. A study of the morphology and fundamental physiological processes of bacteria: their relationship to sanitation, public health, soil fertility, and food preservation. Prerequisite: one year of biology or chemistry or equivalent. Lecture Mon.-Fri., 11:20-12:40; Laboratory Mon.-Thurs., 2:00-4:00. One lab course. *Johnson*

225. Special Problems. Hours to be arranged. *Staff*

359. Research. Hours to be arranged. *Staff*

First Term (Duke Marine Laboratory, Beaufort, North Carolina)

225. Special Problems. Hours to be arranged. *Staff*

359. Research. Hours to be arranged. *Staff*

Second Term (Durham Campus)

225. Special Problems. Hours to be arranged. *Staff*

359. Research. Hours to be arranged. *Staff*

Second Term (Duke Marine Laboratory, Beaufort, North Carolina)

211. Marine Phycology. An introduction to marine algae; their identification, taxonomy, morphology, physiology, and ecology. Field trips complemented by laboratory study, culturing, and preparation of herbarium material. Hours to be arranged. Two courses (6 graduate units). *Searles*

225. Special Problems. Hours to be arranged. *Searles*

359. Research. Hours to be arranged. *Searles*

Third Term (Durham Campus)

226. Special Problems. Hours to be arranged. *Staff*

360. Research. Hours to be arranged. *Staff*

Third Term (Duke Marine Laboratory, Beaufort, North Carolina)

205. Introductory Marine Microbiology. The biology of microorganisms in oceans and estuaries. Prerequisite: one year of college biological science. (Summer session only.) Two courses (6 graduate units). *Staff*

226. Special Problems. Hours to be arranged. *Staff*

360. Research. Hours to be arranged. *Staff*

Chemistry

Professor Louis D. Quin, *Chairman* (101 Paul M. Gross Chemical Laboratory, West Campus); Professor Donald B. Chesnut, *Director of Graduate Studies* (330 Paul M. Gross Chemical Laboratory, West Campus); Associate Professor Richard L. Wells, *Director of Undergraduate Studies* (333 Paul M. Gross Chemical Laboratory, West Campus)

All classes in Chemistry, Term I, will begin on May 22 and continue through June 16. The beginning and ending dates for Chemistry 2 and Chemistry 151 are as follows: Chemistry 2, June 19-July 14; and Chemistry 151, June 26-July 21. In Term III, Chemistry 152 will begin on July 24 and continue through August 18.

First Term

1. General Inorganic Chemistry. Lectures, recitations, and laboratory work on the elementary principles of chemistry and on the occurrence, preparation, properties, and uses of the elements and their compounds. Laboratory daily, 9:30-12:00; recitation and lecture daily, 1:00-3:00. One lab course. *Wells*

61. Physical Chemistry of Aqueous Solutions. An intensive study of chemical equilibria with special attention to the physical chemistry of aqueous solutions, ionic and molecular structure, and elementary thermodynamics. Laboratory experiments illustrate the principles of gravimetric, volumetric, and instrumental analysis. Prerequisites: Chemistry 1-2 and Mathematics 31, or equivalent. Lecture and recitation daily, 9:30-11:00; laboratory daily, 12:00-4:30. One lab course. *Wilder*

275. Thesis Research. Research in the fields of physical, analytical, inorganic, or organic chemistry. Open to those students whose research programs for the M.A. and Ph.D. degrees have been approved by the department and by one of the instructors in charge of the course. Schedule to be arranged. (Not more than 1 unit of credit per week for full-time schedule or 1 unit each two weeks for half-time schedule.) 2 to 8 units. Available during Terms I, II, and III.

Second Term.

2. General Inorganic Chemistry. A continuation of Chemistry 1. Prerequisite: Chemistry 1. Laboratory daily, 9:30-12:00; recitation and lecture daily, 1:00-3:00. One lab course. *Bonk*

151. Organic Chemistry. An introduction to the study of the compounds of carbon in which the chemistry of both aliphatic and aromatic compounds is considered. Laboratory experiments are selected to illustrate the more important reactions, and preparations of organic compounds. Prerequisite: Chemistry 61 or permission of Director of Undergraduate Studies. Lecture daily, 9:30-11:30; laboratory daily, 12:30-3:30. One lab course. *Wolfe*

Third Term

152. Organic Chemistry. A continuation of Chemistry 151. Prerequisite: Chemistry 151. Lecture daily, 9:30-11:30; laboratory daily, 12:30-3:30. One lab course. *Boatman*

Classical Studies

Professor John F. Oates, *Chairman* (325 Carr Building, East Campus); Assistant Professor Peter H. Burian, *Director of Undergraduate Studies* (320 Carr Building, East Campus)

GREEK

First Term

1. Elementary Greek. Grammar and an introduction to reading. 9:40-11:00. One course. *Willis*

Second Term

2. Elementary Greek. A continuation of Greek 1. 9:40-11:00. One course. *Stanley*

CLASSICAL STUDIES

First Term

53. Greek History. (Also History 53.) The political and intellectual his-

tory of the Hellenes from earliest times to the death of Alexander the Great. 8:00-9:20. One course. *Oates*

54. Roman History. (Also History 54.) The Roman republic and empire to the Council of Nicaea. 9:40-11:00. One course. *Oates*

114. Greek Drama. Reading in English translation of Aeschylus, Sophocles, Euripides, Aristophanes, and Menander. 11:20-12:40. One course. *Willis*

Second Term

51. Greek Literature in English Translation. Reading in translation of the major Greek authors: Homer, *Odyssey*; lyric poets; Aeschylus, *Oresteia*; Herodotus; Sophocles, *Oedipus Tyrannus* and *Antigone*; Euripides, *Medea*, *Hippolytus*, and *Bacchae*; Plato, *Symposium*. 11:20-12:40. One course. *Stanley*

Comparative Literature

Second Term

191. Independent Study. Directed reading and research. Open only to qualified students in the junior year by permission of the department. One course. *Salinger*

193. Independent Study. Directed reading and research. Open only to qualified students in the senior year by permission of the department. One course. *Salinger*

205. Foundations of Twentieth-Century European Literature. The roots of the contemporary scene (Proust, Mann, Rilke, Kafka, Lagerkvist, Camus, Gide, Hesse) evolving toward a mythology of man. 11:20-12:40. One course (3 graduate units). *Salinger*

Computer Science

Professor Thomas M. Gallie, Jr., *Director* (401 AROD)

First Term

51. Introduction to Digital Computation. Flow charts; an assembly language; program structures, subroutines, data structures, arrays, polynomials; an algorithmic language; numerical linear algebra, matrix inversion, linear programming, and least-squares techniques. 1:20-2:40. One lab course. *Patrick*

222. Numerical Analysis II. Numerical evaluation of eigenvalues and eigenvectors, numerical methods for solving ordinary differential equations, partial differential equations, and integral equations. Prerequisite: Computer Science 221 or consent of instructor. 9:40-11:00. One course (3 graduate units). *Patrick*

Economics

Professor David G. Davies, *Chairman* (302 Social Sciences Building, West Campus); Professor William P. Yohe, *Director of Graduate Studies* (313 Social Sciences Building, West Campus); Associate Professor John Vernon, *Director of Undergraduate Studies* (306 Social Sciences Building, West Campus)

First Term

51. Principles of Economics. Examination of the main features of the American economy, measurement of national income, and analysis of forces determining national output and income; fluctuation and growth of output; monetary and fiscal policies for stability and growth. 9:40-11:00. One course. *Yohe*

108. Economics of War. Conflict theory, causes and economic consequences of war, military manpower, military-industrial complex, disarmament and the economy. Prerequisite: Economics 52. 11:20-12:40. One course. *Fitzgerald*

Second Term

52. Principles of Economics. Examination of forces determining prices and production of goods, distribution of income; problems of agriculture, labor, international trade, economic development, and government in relation to business. 9:40-11:00. One course. *Graham*

73. Economics of Contemporary Issues. Application of the basic tools of economic analysis to matters of current social concern. Possible topics include the economics of environmental quality and "free" resources, crime, exploitation and discrimination (racial and sexual), the ghetto, wage and price controls, education, athletics and the welfare-warfare state. Prerequisites: Economics 51 and 52. 8:00-9:20. One course. *Havrilesky*

187-287. Public Finance. An analysis of the impact of governmental expenditures, revenues, and debts on the allocation of resources, the redistribution of income, and the stabilization of income. 11:20-12:40. One course (3 graduate units). *Davies*

Education

Professor Allan S. Hurlburt, *Chairman* (213-I West Duke Building, East Campus); Associate Professor Charles B. Johnson, *Director of Graduate Studies* (213-C West Duke Building, East Campus); Associate Professor Henry L. Sublett, *Director of Undergraduate Studies* (213-K West Duke Building, East Campus)

Duke University is accredited by the National Council of Accreditation of Teacher Education for the preparation of elementary and secondary school teachers and school service personnel, with the doctor's degree as the highest degree approved.

It is the intention of the department to make available to degree candidates

all courses ordinarily required for certification as graduate teachers, counselors, principals, and superintendents. These courses will normally be offered at least once every three years.

First Term

113. History of American Education. A study of American education from colonial times to the present. The development of schools—their organizations, administration, curriculum, and methods as seen in relation to the social forces that have produced our particular type of civilization. 9:40-11:00. One course. *Johnson*

Second Term

118. Educational Psychology. Psychology of learning, individual and social development, and psychology of adjustment as related to problems of instruction and the process of education. Prerequisite: Psychology 92 or 93. 1:20-2:40. One course. *Davis*

207. Social History of Twentieth-Century American Education. The development of twentieth-century American education in the context of social and intellectual history. 8:00-9:20. One course (3 graduate units). *Johnson*

211. The Problem Child. (Also Psychology 211.) Study of problem behavior and adjustment in children with emphasis on the causes and treatment of conduct and neurotic disorders of the maladjusted child. Particular attention will be paid to mental hygiene principles in the handling of problem children in school and home. 9:40-11:00. One course (3 graduate units). *I. Gehman*

213. Elementary School Organization and Administration. This course is designed especially for principals, teachers, and other prospective members of the elementary school staff. The scope of elementary education is considered to encompass nursery school, kindergarten, and the elementary school. Special treatment is given to the problems of internal organization and management of the elementary school, and its integration with the secondary school level. 1:20-2:40. One course (3 graduate units). *Sublett*

222. New Developments in Elementary School Curriculum. Curriculum and materials of the modern elementary school. Special attention is given to innovations such as the open classroom, team teaching, non-graded programs, and individualized instruction. Recent emphasis on early childhood education and the middle school is assessed. 11:20-12:40. One course (3 graduate units). *Sublett*

225. The Teaching of History and the Social Studies. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. 8:00-9:20. One course (3 graduate units). *Cartwright*

233. Improvement of Instruction in English. This course will acquaint the student with recent developments in the teaching of English and will introduce him to research techniques in the field. Each student will pursue an extensive independent study based on his particular interests. 11:20-12:40. One course (3 graduate units). *Shuman*

239. Teaching of Grammar, Composition, Mechanics, and Usage in Secondary Schools. This course will be concerned with recent developments in the teaching of grammar, composition, mechanics, and usage. Students will write and grade compositions. Each student will undertake an appropriate term project. 2:00-3:20. One course (3 graduate units). *Shuman*

243. Personality Dynamics. A study of personality structure and dynamics with emphasis upon the implications for counseling and instruction. Prerequisite: 6 units of psychology or educational psychology. 8:00-9:20. One course (3 graduate units). *S. Gehman*

246. Teaching of Mathematics. This course deals with such topics as aims, curriculum, course and lesson planning, and classroom procedure for teaching secondary school mathematics. 2:00-3:20. One course (3 graduate units). *Troy*

249. Exceptional Children. A survey of the major categories of exceptional children—mental retardation, emotional disturbance, brain injured, learning disabilities, physically handicapped, visual and auditory deficits, culturally deprived, and gifted. Etiology (biological and environmental factors), diagnosis, and treatment will be discussed. 11:20-12:40. One course (3 graduate units). *Davis*

250. Teaching Emotionally Disturbed Children: Internship. Basic principles and practices in teaching and the organization of instructional materials. Work with children under the supervision of a certified teacher of emotionally disturbed children. Experience in general classroom teaching and small group and individualized instruction. Participation in staff conferences involving psychiatrists, psychologists, social case workers, and professional educators. Hours to be arranged. One course (3 graduate units). *S. Gehman*

276. The Teaching of High-School Science. Discussion, lectures, and collateral reading, related to such topics as aims, tests, curriculum, classroom and laboratory procedure, field trips, and course and lesson planning for secondary school science. 2:00-4:00, Monday through Friday. One course (3 graduate units). *Githens*

315. Seminar in Secondary School Teaching. Advanced-level consideration of principles, practices, and problems in secondary school instruction. Designed particularly to accompany an internship. For students without previous internship credit, this course must be accompanied by Education 216.

315.1 12:15-1:35. 3 graduate units. *Carbone*

315.2 8:00-9:20. 3 graduate units. *Carbone*

332. Supervision of Instruction. A study of the nature of supervision, underlying principles, and techniques of working with individual teachers and with groups. July 5-July 21. 11:20-12:40 and 2:00-3:20. 3 graduate units. *Hurlburt*

Third Term

217. The Psychological Principles of Education. An advanced study of teaching, learning, and the learner. Selected problems guiding the reading of students will be discussed in class. 8:00-9:20. One course (3 graduate units). *Katzenmeyer*

223. Teaching the Language Arts. Comparison of current methods and materials in the teaching of handwriting, spelling, and oral and written composition. Analysis and correction of basic difficulties. Increasing opportunities for creative expression. Correlation of language arts with other activities and school subjects. 9:40-11:00. One course (3 graduate units). *Adams*

226. Teaching Reading in the Elementary School. A study of the nature of the reading process and of principles, methods, and materials for developmental and remedial programs. 11:20-12:40. One course (3 graduate units). *Adams*

234. Secondary School Organization and Administration. This course is designed especially for principals, teachers, and other prospective members of the secondary school staff. The scope of secondary education is considered to encompass junior high school, regular high school, senior high, and junior college. Special treatment is given to the problems of internal organization and management. 9:40-11:00. One course (3 graduate units). *Pittillo*

253. Law and Education. This course examines elements and problems of educational organizations which have come within the purview of constitutional and legislative provisions and court decisions. Emphasis is placed on conflict among members of educational organizations and between educational organizations and other parties which has resulted in appellate court decisions. Students are expected to select appropriate problems for intensive study. July 24-August 9. 11:20-12:40 and 2:00-3:20. One course. (3 graduate units). *Martin*

256. Classroom Assessment of Student Achievement. A study of the techniques to be used by classroom teachers in the evaluation of student progress. Special emphasis will be directed to teacher-made tests. 11:20-12:40. One course (3 graduate units). *Colver*

321. Educational Management. A study of theory and practice of management as applied to education. This course is intended for anyone who has or is preparing to have major management responsibilities in the field of education. 8:00-9:20. 3 graduate units. *Pittillo*

360. Seminar on Instructional Strategies. This seminar will present various theoretical and analytical models for comprehending teacher instructional strategies and teacher-student interaction in regard to their influence on the learning process. Students will review relevant research, analyze tapescripts and videotapes of classroom performance, and pursue applications of the models in a variety of settings. 9:40-11:00. 3 graduate units. *Katzenmeyer*

Engineering

Professor George W. Pearsall, *Dean of the School of Engineering* (136 Engineering Building, West Campus); Professor Otto Meier, Jr., *Associate Dean for Undergraduate Studies* (136 Engineering Building, West Campus)

First Term

C.E. 365. Advanced Topics in Civil Engineering. Opportunity for study of

advanced subjects relating to programs within the Civil Engineering Department tailored to fit the requirements of a small group. 1 to 3 units. *Graduate Staff*

C.E. 399. Special Readings in Civil Engineering. Special individual readings in a specific area of study in civil engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Graduate Staff*

E.E. 265. Advanced Topics in Electrical Engineering. Opportunity for study of advanced subjects related to programs within the Electrical Engineering Department tailored to fit the requirements of a small group. Prerequisite: approval of the Director of Graduate Studies and of instructor under whom work will be done. 1 to 3 units. *Graduate Staff*

E.E. 399. Special Readings in Electrical Engineering. Special individual readings in a specified area of study in electrical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Graduate Staff*

M.E. 197-198. Projects in Mechanical Engineering. This course may be assigned by the Chairman of the department to outstanding seniors who express a desire for such work and who have shown aptitude for research in one distinct field of mechanical engineering. Prerequisite: 3.0 average and senior standing. One-quarter to two courses. *Staff*

M.E. 265. Advanced Topics in Mechanical Engineering. Opportunity for study of advanced subjects related to programs within the Mechanical Engineering Department tailored to fit the requirements of a small group. Prerequisite: approval of the Director of Graduate Studies and of instructor under whom work will be done. 1 to 3 units. *Graduate Staff*

M.E. 399. Special Readings in Mechanical Engineering. Special individual readings in a specified area of study in mechanical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Graduate Staff*

English

Professor Oliver Ferguson, *Chairman* (325 Allen Building, West Campus); Professor John L. Lievsay, *Director of Graduate Studies* (315 Allen Building, West Campus); Professor George Williams, *Director of Undergraduate Studies* (402 Allen Building, West Campus)

Candidates for the master's degree in English are expected to have had at least 18 units in undergraduate courses above the sophomore level. The department may also require additional courses if the work of the student in his first term indicates inadequate preparation.

First Term

55. Representative British Writers. Chaucer's Prologue to *The Canterbury Tales*, and at least two tales, Shakespeare's *I Henry IV*, *Hamlet*, or *King Lear*, and one other play, John Donne's poetry (selections), and Milton's *Paradise Lost* (selections) and some of the shorter poems. 8:00-9:20. One course. *Clum*

158. The English Novel in the Twentieth Century. Some of the writers studied are Conrad, Lawrence, Forster, Joyce, Woolf, Huxley, Caryl Phillips, and Golding. 8:00-9:20. One course. *Smith*

175. American Literature from 1860 to 1915. Dickinson, Twain, James, the social and philosophical essayists, Crane, Dreiser, Robinson, and Frost. (Not open to students who have taken the old 138.) 11:20-12:40. One course. *Jones*

182S. Conference on Poetry. Intensive studies in selected poems of Yeats, Frost, and Eliot, with attention to critical theory and emphasis on form and style. 9:40-11:00. One course. *Smith*

235. The Eighteenth Century. Swift, Pope, Defoe, Addison, Steele, and others. 9:40-11:00. One course (3 graduate units). *Ferguson*

263. American Literature, 1800-1865. The writers emphasized are Emerson, Thoreau, and Hawthorne. 1:20-2:40. One course (3 graduate units). *Jones*

Second Term

56. Representative British Writers. Novels by Fielding (Joseph Andrews), Dickens (*Great Expectations*), and selections from the poetry of Pope, Wordsworth, Keats, and Yeats. 8:00-9:20. One course. *DeNeef*

124. Shakespeare. The tragedies and later comedies. 9:40-11:00. One course. *Bowman*

138. The English Novel from the Beginnings to 1800. Some of the writers studied are Nashe, Deloney, Lyly, Sidney, Bunyan, Behn, Defoe, Richardson, Fielding, Smollett, and Sterne. 11:20-12:40. One course. *Jackson*

176. American Literature since 1915. Poetry, fiction, drama, and critical prose from Stein, Anderson, O'Neill, Hemingway, and Faulkner to contemporary authors such as Malamud and R. Lowell. (Not open to students who have taken the old 138.) 8:00-9:20. One course. *Budd*

241. English Literature of the Early Nineteenth Century. The Romantic poets and prose writers, 1790-1810, with special attention to Wordsworth, Coleridge, and Scott. 8:00-9:20. One course (3 graduate units). *Stevenson*

275. American Literature Since 1920. Selected fiction from Gertrude Stein to the present. 9:40-11:00. One course (3 graduate units). *Duffey*

347. Studies in Victorian Poetry. Analysis of themes, forms, and sources in the works of Tennyson, Browning, Arnold, Rossetti, Swinburne, Meredith, Hardy, and Hopkins. 11:20-12:40. 3 graduate units. *Stevenson*

Third Term

174. American Literature from 1800-1860. Prose and poetry of American Romanticism: Emerson, Thoreau, Hawthorne, Poe, Melville, and Whitman. 11:20-12:40. One course. *Gerber*

209. Present-Day English. A description of present-day American English

from the point of view of modern linguistic theory; comparison of traditional and structural grammars; semantic change; the relation of the written to the spoken language; usage. 1:20-2:40. One course (3 graduate units). *Nygard*

216. Chaucer. *Troilus and Criseyde* and the Minor Poems. 11:20-12:40. One course (3 graduate units). *Reiss*

264. American Literature, 1800-1865. The writers emphasized are Poe and Melville. 9:40-11:00. One course (3 graduate units). *Turner*

268. American Literature, 1865-1920. Selected works of representative authors of the period: Crane, Norris, Moody, London, Dreiser, Edith Wharton, Willa Cather, O'Neill, Robinson, and Frost. 8:00-9:20. One course (3 graduate units). *Budd*

369. Studies in American Humor. The native tradition in the Down-East humorists and the humorists of the Old Southwest, in Mark Twain and his contemporaries and afterward. 11:20-12:40. 3 graduate units. *Turner*

Forestry

Professor Charles W. Ralston, *Dean of the School of Forestry* (213 Biological Sciences Building, West Campus); Professor Roger F. Anderson, *Director of Graduate Studies* (04 Biological Sciences Building, West Campus)

Qualified students may engage in thesis research in certain branches of forestry during the summer session with the approval of the instructor concerned and the Dean of the School of Forestry, or of the Director of Graduate Studies in the case of work taken through the Graduate School.

357. Research in Forestry. Open to students whose research programs for the M.F. or D.F. degree have been approved by the Dean of the School of Forestry and the instructor responsible for directing the research and whose programs for the A.M., M.S., or Ph.D. degree have been approved by the Director of Graduate Studies and the instructor in charge. (Credits and schedule to be arranged.) May 15-August 24, 2 to 12 units. (Not more than 1 unit of credit per week for full-time schedule or 1 unit each two weeks for half-time schedule.) Consult courses 301-302 in the *Bulletin of the School of Forestry* for the letter designation of branches of forestry in which research is to be conducted. *Staff*

Geology

Professor S. Duncan Heron, Jr., *Chairman* (118 Science Building, East Campus); Associate Professor Ronald D. Perkins, *Acting Director of Graduate Studies* (111 Science Building, East Campus); Associate Professor William J. Furbish, *Director of Undergraduate Studies* (104 Science Building, East Campus)

The class in Geology 1, Term I, will begin on May 22 and continue through June 16. The class in Geology 2, Term II, will begin on June 19 and continue through July 14. Students who wish to avoid paying a late registration fee must have their registration completed in advance of these dates. For registration dates see General Registration on page 29 of this *Bulletin*.

First Term (Durham Campus)

1. Geological Environments and Man. Physical and chemical environments acting on the earth with special emphasis on their interaction with man. Lectures or recitations daily, 8:00-10:30; laboratory daily, 1:00-3:00. May 22-June 16. One lab course. *Heron*

Second Term (Durham Campus)

2. History of the Earth. Including the physical development and the geological evolution of life. Lecture or recitations, 8:00-10:30, Monday through Friday; laboratory, 1:00-3:00, Monday through Thursday. June 19-July 14. One lab course. *Lynts*

Third Term (Duke Marine Laboratory, Beaufort)

205. Geological Oceanography. The study of the broad geologic aspects of the ocean basins, including origin, bottom physiography, sediment distributions, and sedimentary processes. Observations in the field will be emphasized and will include training in sampling procedures for both shallow and deep water. (This course is not open to students who have completed Geology 206.) Two courses (6 graduate units). *Pilkey*

German

Professor Leland Phelps, *Chairman and Director of Graduate Studies* (102 Language Building, West Campus); Assistant Professor Richey Novak, *Director of Undergraduate Studies* (111 Language Building, West Campus)

The work in German 1, 2, 63, and 64 will be coordinated with listening and oral practice in the language laboratory which students in German classes will be privileged to attend.

First Term

1. Elementary German. Practice in understanding, speaking, reading, and writing. Classroom techniques are combined with those of the language laboratory. 11:20-12:40; and on Tuesdays and Friday, 2:00-3:20. One lab course. *Bessent*

63. Intermediate German. Grammar review and composition; reading of short stories, novels, and poems. Prerequisite: German 1-2, or two units of high school German. 9:40-11:00; and on Monday and Thursday, 2:00-3:30. One lab course. *Alt*

64. Intermediate German. Continuation of German 63. Prerequisite: German 63, which may be taken concurrently. 11:20-12:40; and on Tuesdays and Fridays, 2:00-3:20. One lab course. *Alt*

191. Independent Study. Directed reading and research. Open only to qualified students in the junior year by permission of the department. Hours to be arranged. One course. *Salinger*

193. Independent Study. Directed reading and research. Open only to qualified students in the senior year by permission of the department. Hours to be arranged. One course. *Salinger*.

Study Abroad Program

Six-week program (May 12-June 26, 1972) in Münster, Germany. Two course credit allowed. Director: *Mr. Günter Klages*. For complete details contact Mr. Klages or Chairman of German Department.

Second Term

2. Elementary German. Practice in understanding, speaking, reading, and writing. Classroom techniques are combined with those of the language laboratory. Prerequisite: German 1 or equivalent. 11:20-12:40; and on Tuesdays and Fridays, 2:00-3:20. One lab course. *Stern*

192. Independent Study. Directed reading and research. Open only to qualified students in the junior year by permission of the department. Hours to be arranged. One course. *Salinger*.

194. Independent Study. Directed reading and research. Open only to qualified students in the senior year by permission of the department. Hours to be arranged. One course. *Salinger*.

Graduate Reading Course. An intensive course in German to develop rapidly the ability to read technical German in several fields. For graduate students only. 9:40-11:00. No degree credit. *Novak*

Health and Physical Education (Men)

Edmund M. Cameron, *Director*, Trinity College and College of Engineering (109 Indoor Stadium, West Campus); Professor J. A. Friedrich, *Chairman*, Health and Physical Education (107 Card Gymnasium, West Campus)

First Term

171. Recreational Leadership. Theories and philosophies of play and recreation with emphasis on leadership techniques and application to community organizations, school, and family situations. 9:40-11:00. One course. *Friedrich*

172. The Administration of Health and Physical Education in Secondary Schools. Presents the everyday problems that arise in the experience of the teacher of health and physical education. Open to juniors and seniors. 11:20-12:40. One course. *Friedrich*

Second Term

173. Protective Practices in Physical Education. Training and conditioning of athletic teams and the prevention, diagnosis, and treatment of athletic injuries. 8:00-9:20. One course. *Riebel*

Health and Physical Education (Women)

Professor Elizabeth C. Bookhout, *Chairman* (101 Gym, East Campus); Professor Modena Lewis, *Director of Undergraduate Studies* (103 Gym, East Campus)

First Term

1. Modern Dance. May be taken to fulfill physical education requirement (P.E. 1). May be taken for elective credit by students who have fulfilled physical education requirement (P.E. 61, 161). Monday through Thursday. 4:00-5:00. Quarter-course. *White*

135. Principles of Contemporary Dance Composition. Prerequisite: beginning modern dance and intermediate modern dance (or permission of instructor). Monday through Friday. 7:00 p.m.-8:20 p.m. One course. *White*

History

Professor Joel Colton, *Chairman* (235 Allen Building, West Campus); Professor Charles R. Young, *Director of Graduate Studies* (237 Allen Building, West Campus); Professor Frederic Hollyday, *Director of Undergraduate Studies* (227 Allen Building, West Campus)

For admission to candidacy for a master's degree in history, the student must present a total of 12 units of prior work in history, of which at least 6 must be in American history if he plans to take his major work in that field. Candidates for the degrees of Master of Arts and Master of Arts in Teaching are required to complete at least 3 units of seminar work and are strongly urged to enroll for this work after they have attended one summer session term. (See courses numbered 300 or above.)

First Term

51. A History of European Civilization. From the Italian Renaissance to about 1815. 8:00-9:20. One course. *Parker*

53. Greek History. The political and intellectual history of the Hellenes from earliest times to the death of Alexander the Great. (Also listed as Classical Studies 53.) 8:00-9:20. One course. *Oates*

54. Roman History. The Roman republic and empire to the Council of Nicaea. (Also listed as Classical Studies 54.) 9:40-11:00. One course. *Oates*

91. The Development of American Democracy to 1865. A study of the trends vital to an understanding of the United States today. Problems of foreign policy, the growth of capitalism, political practices, social reform, and conflicting ideals are considered in relation to the main theme, the development of American democracy. 9:40-11:00. One course. *Durden*

114. America in the Twentieth Century. Political, economic, and social problems of twentieth-century United States. Emphasis will be on the years since the 1930's. 8:00-9:20. One course. *Chafe*

143. History of Modern Japan. Japan from 1600 to the present, the transition from the traditional to the modern state. 9:40-11:00. One course. *Silberman*

277. The Coming of the Civil War, 1820-1861. 11:20-12:40. One course (3 graduate units). *Durden*

Second Term

52. A History of European Civilization. From about 1815 to the present. 8:00-9:20. One course. *Parker*

92. The Development of American Democracy, 1865 to the Present. A continuation of History 91 with emphasis upon the emergence of contemporary problems. 9:40-11:00. One course. *Davis*

118. European Imperialism and Colonialism. The new imperialism and the modernization of post-colonial societies. 9:40-11:00. One course. *Cell*

162. History of Russia. Russia and the Soviet Union in the twentieth-century. 11:20-12:40. One course. *Lerner*

216. The Diplomatic History of the United States. Emphasis will be on the years since 1898. 11:20-12:40. One course (3 graduate units). *Davis*

239. History of Socialism and Communism. Origins and development of socialist and communist movements. 1:20-2:40. One course (3 graduate units). *Lerner*

264. The American Revolution. The background, progress, and results of the American Revolution. 9:40-11:00. One course (3 graduate units). *Higgins*

Third Term

116. History of Africa. Social, political, and economic developments in tropical Africa: colonial and contemporary times. 8:00-9:20. One course. *Hartwig*

240. Aspects of Traditional and Modern African Culture. Introduction to the oral and written literature and musical and artistic traditions. 9:40-11:00. One course (3 graduate units). *Hartwig*

252. Recent European History. A history of political, economic, and intellectual developments in Europe. Emphasis will be on the years since 1929. 11:20-12:40. One course (3 graduate units). *Colton*

302. Seminar in Historical Investigation. 2:00-3:20 or at an hour to be arranged. 3 graduate units. *Colton*

Hospital Administration

Professor Charles H. Frenzel, *Director of the Graduate Program in Hospital Administration* (234B Baker House); Assistant Professor Donald S. Smith, II, *Coordinator of Graduate Studies* (234B Baker House)

Third Term

201. History and Development of Hospitals and Other Health Agencies.

This course is designed to give the student a broad concept of the health field. It includes a study of the evolution of health institutions; analysis of medical care organizations in the United States; the emergence of the health professions. Permission of the instructor required. 3 units. *Smith*

Management Sciences

Professor Louis D. Volpp, *Chairman* (115 Social Sciences Building, West Campus); Professor Robert L. Dickens, *Director of Undergraduate Studies* (301-A Social Sciences Building, West Campus)

First Term

50. Elementary Theory of Economic Enterprise. Analysis of the internal resource allocation problem of the enterprise, of market structures, and the relationship between the two. Topics include marginal analysis, theories of competitive market structures, and introduction to special problems of finance, marketing, and production. Prerequisite or corequisite: Mathematics 32. 8:00-9:20. One course. *Maier*

55. Quantitative Analysis for Management. Some mathematical theory and techniques used in the study of economic enterprise, such as classical optimization, optimization under constraints, introductory matrix and linear algebra, basic probability theory, and special probability distributions. Prerequisite: Mathematics 31. Not open to students who have had Economics 54 or Mathematics 73 or 135. 9:40-11:00. One course. *Kuhn*

100. Introduction to Financial Accounting. Conceptual framework of external financial reporting, focusing on the nature and purpose of accounting, the measurement of status and activity in economics terms and the interpretation of published financial statements. Prerequisite: sophomore standing. 8:00-9:20. One course. *Hagerman*

120. Organization Theory. Introduction to recent theories of and research on the structure and behavior of complex organizations, with special reference to business firms. Topics to be covered include: rationality, authority, bureaucracy, and other concepts; power, decision-making, informal organization, organization change, and other internal process phenomena; effects of technology, culture, and other environmental influences; brief consideration of organization design. Prerequisite: Management Sciences 50 and 60. 11:20-12:40. One course. *Kuhn*

Second Term

60. Probability and Statistics for Decision Problems. Fundamentals of probability theory, classical and Bayesian statistical analysis, and elementary decision theory. The application of statistical analysis to decision problems is stressed. Topics include sample spaces, probability distributions, combinations and permuta-

tions, functions of random variables. Bayes Theorem, Central Limit Theorem, estimation, analysis of variance, regression and correlation analysis, utility, risk, uncertainty, and decision criteria. Prerequisite: Mathematics 31. 9:20-11:00. One course. *Aldrich*

130. Information Systems. An analysis of the data needed for economic decision relating to business enterprises and of the systems used in accumulating, analyzing, interpreting, and presenting the data to various users. Financial reporting to external users and managerial use of information for decision-making are stressed. Prerequisites: Management Sciences 50 and 60. 1:20-2:40. One course. *Hagerman*

Mathematics

Professor Joseph R. Schoenfield, *Chairman* (135-C Physics Building, West Campus); Associate Professor Donald S. Burdick, *Director of Graduate Studies* (135-D Physics Building, West Campus); Associate Professor Richard E. Hodel, *Director of Undergraduate Studies* (135-D Physics Building, West Campus)

Graduate students are invited to consult with the Director of Graduate Studies concerning their programs.

First Term

31. Introductory Mathematical Analysis. Language of logic and sets, continuity, differentiation, integration, the fundamental theorem of the calculus. Prerequisite: 3 units of college preparatory mathematics. 11:20-12:40. One course. *Burdick*

133. Basic Statistics. Principal statistical methods including application to psychological, economic, business administration, and educational problems. Techniques of data collection and presentation, hypothesis testing, using the chi-square, t, and F distributions, interval estimation and linear regression. Not open to students who have had Economics 138 or Psychology 117. 9:40-11:00. One course. *Wilkinson*

263. Universal Algebra. Algebraic structures; free algebras and the word problem; varieties of algebras; applications. Prerequisite: Mathematics 236. 11:20-12:40. One course (3 graduate units). *Smith*

Second Term

32. Introductory Mathematical Analysis. Elementary and transcendental functions, sequences, series, Taylor's formula. Prerequisite: Mathematics 31. 11:20-12:40. One course. *Wong*

216. Intermediate Analysis. Series; uniform convergence, integration; theory of functions of a real variable. 8:00-9:20. One course (3 graduate units). *Moore*

220. Advanced Linear Algebra with Application. Solutions of systems of linear inequalities; applications to linear programming and game theory; computation of eigenvalues and eigenvectors. 9:40-11:00. One course (3 graduate units). *Henson*

Third Term

204. Geometry for Teachers. Metric and synthetic approaches to plane and solid geometry; affine geometry; an algebraic model of Euclidean geometry. 9:40-11:00. One course (3 graduate units). *Herr*

219. Advanced Modern Algebra. Fields, vector spaces, and groups; Galois Theory; theory of equations. Prerequisite: some familiarity with modern algebra and linear algebra. 11:20-12:40. One course (3 graduate units). *Warner*

377. Topics in Topology. Advanced topics in topology to be selected from areas of current research. 9:40-11:00. 3 graduate units. *Hodel*

Microbiology

Second Term

325. Medical Mycology. A lecture and laboratory course with emphasis on those fungi which cause disease in man and animals. The course includes practical laboratory work with materials from patients in Duke Hospital and those sent to the Duke Fungus Registry from outside sources. July 3-29, 1972. Lecture daily, Monday-Saturday, 8:00-9:00 a.m.; laboratory, Monday-Friday, 9:00-12:00 and 1:30-4:30 p.m., Saturday 9:00-12:00. 4 units. *Conant*

Music

Professor Julia W. Mueller, *Chairman* (110 Asbury Building, East Campus; Assistant Professor Luca DiCecco, *Director of Undergraduate Studies* (202 Baldwin Building, East Campus)

First Term

125. Masterworks of Music Literature. An intensive study of selected masterworks which represent the principal currents in modern music history. Compositions by Bach, Mozart, Beethoven, Brahms, Debussy, and Bartok will constitute a frame of reference for historical, biographical, and stylistic analysis. 8:00-9:20. One course. *Staff*

Nursing

Professor Ruby L. Wilson, *Dean* (113 Hanes House, West Campus)

First Term

166. Nursing Practicum—Patients with Neurological Problems. Study of selected neurological problems and the care of patients presenting these problems. Major focus will be on the nurse's role in the diagnosis, treatment, and care of patients with brain and spinal cord conditions. Two courses. Pass/Fail. Class, Monday-Friday 2:00-3:30; Clinical, Monday-Friday 8:00-12:00. *Jacobansky*

179. Nursing and Renal Disease. Planned experience providing nursing care for patients with clinical disturbances of renal function and hypertension utilizing current treatment modalities in a variety of settings. One course. Pass/Fail. Class, Monday 8:00-9:20, Friday 9:40-11:00; Clinical,* Tuesday 8:00-11:00, Wednesday 8:00-11:00, Thursday 8:00-11:00, Friday 8:00-9:20. *Brundage*

Pathology

Professor Thomas D. Kinney, *Chairman* (M301, Davison, West Campus)
Professor Joachim R. Sommer, *Director of Graduate Studies* (301 Davison, West Campus)

First Term

M357. Research. Hours to be arranged. *Staff*

M361. Advanced General Pathology. See *Bulletin of the Graduate School* for description. 6 units. *Staff*

Second Term

M357. Research.

M362. Second part of M361. Advanced General Pathology.

Third Term

M357. Research. Hours to be arranged. *Staff*

Philosophy

Professor Paul Welsh, *Chairman* (201-K West Duke Building, East Campus); Associate Professor Edward Mahoney, *Director of Graduate Studies* (201-J West Duke Building, East Campus); Assistant Professor Richard E. Aquila, *Director of Undergraduate Studies* (201-G West Duke Building, East Campus)

First Term

93. History of Ancient Philosophy. The pre-Socrates, Socrates, Plato, Aristotle, and post-Aristotelian system. Freshman prerequisite: previous philosophy course and permission of the instructor. 9:40-11:00. One course. *Sanford*

94. History of Modern Philosophy. Bacon, Hobbes, Decartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. Freshman prerequisite: previous philosophy course and permission of the instructor. 11:20-12:40. One course. *Roberts*

Second Term

48. Logic. A study of the conditions of effective thinking and clear com-

*Clinical times are approximate and will be adjusted to take advantage of learning experiences scheduled outside these times.

munication. Examination of the basic principles of deductive reasoning. 9:40-11:00. One course. *Kalke*

106. Philosophy of Law. Natural law theory; legal positivism; legal realism; the relation of law and morality. 11:20-12:40. One course. *Benditt*

Physics

Professor Henry A. Fairbank, *Chairman* (119 Physics Building, West Campus); Associate Professor Lawrence E. Evans, *Director of Graduate Studies* (213 Physics Building, West Campus); Assistant Professor Carl M. Rose, Jr., *Director of Undergraduate Studies* (242 Physics Building, West Campus)

Classes in Physics 51, Term I, will begin on May 22 and continue through June 16. Classes in Physics 52, Term II, will begin June 19 and continue through July 14. Students who wish to avoid paying a late registration fee must have their registration completed in advance of these dates. For registration dates see General Registration on page 29 of this Bulletin.

First Term

51. General Physics. This course treats the basic principles of general physics in a more quantitative manner than Physics 1-2. It meets in a thorough way the physics requirement for entrance into the study of either medicine or engineering, and is well suited for the general science student. This course is not open for credit for students who have completed Physics 1-2. 9:30-4:00. Prerequisites: Mathematics 21, 22, or equivalent. One lab course. *Evans*

215. Introduction to Quantum Mechanics. Wave-mechanics and elementary applications; the hydrogen-like atoms; electron spin and angular momentum; operators and eigenvalues; stationary state perturbation theory; identical particles. Prerequisites: Physics 162, 182 or equivalents. This course will begin May 15 and end June 16. Lectures daily, 9:40-11:00. One course. *Han*

353X. Thesis Seminar. Students who are properly qualified may carry on research work under direction. Credits and hours to be arranged. *Staff*

Second Term

52. General Physics. A continuation of Physics 51. Prerequisite: Physics 51. 9:30-4:00. One lab course. *Evans*

Physiology

Professor Daniel C. Tosteson, *Chairman* (388 Medical Sciences I); Associate Professor George M. Padilla, *Director of Graduate Studies* (340 Medical Sciences I)

Third Term (Duke Marine Laboratory, Beaufort)

212L. Marine Membrane Physiology. Physiology of marine and estuarine organisms, with emphasis on cellular transport and electrophysiological processes.

This course will include laboratory work on functions, mechanisms, and comparative aspects of ionic and osmotic regulation in marine plants and animals. Prerequisite: permission of instructor. (Also listed as Zoology 212L). Given at Beaufort. Two courses (6 graduate units). *Gutknecht and Others*

Political Science

Professor Ralph Braibanti, *Chairman* (214 Perkins Library, West Campus); Associate Professor Peter G. Fish, *Director of Graduate Studies* (308 Perkins Library, West Campus); Assistant Professor Thomas A. Spragens, *Director of Undergraduate Studies* (313 Perkins Library, West Campus)

First Term

61. The American Political System. Theory and practice of American government and politics. Federal-state relations, the separation and interrelationships of the executive, legislative, and judicial branches of government, judicial review, the role of political parties and public opinion, the formulation and execution of domestic and foreign policy, civil liberties. 8:00-9:20. One course. *Spragens*

180-250. Comparative Government and Politics—Southern Asia. Political development of India and Pakistan, with reference to contemporary events in Asia. The rise of China and Japan and new patterns of power resulting from the Nixon visit to Peking. 11:20-12:40. One course (3 graduate units). *Braibanti*

Second Term

210. Politics and Education. An examination of the various governmental impacts on educational decision-making. 8:00-9:20. One course (3 graduate units). *Leach*

291. Problems of Urban Government. Analysis of problems in the structure and functions of urban governments in the United States. 9:40-11:00. One course (3 graduate units). *Leach*

Third Term

100. The Politics of Civil Rights and Liberties in America. Development and purposes, emphasizing the diverse institutional and other forces that enlarge or constrict them. 9:40-11:00. One course. *Fish*

280. Comparative Government and Politics: Sub-Saharan Africa. Particular attention will be given to traditionalism and modernization, ideologies, leadership, party systems, the adaption of parliamentary institutions, Africanization of the civil services, and the problem of political integration. 11:20-12:40. One course (3 graduate units). *Johns*

Psychology

Professor Edward E. Jones, *Chairman* (226 Sociology-Psychology Building,

West Campus); Associate Professor John Staddon, *Director of Graduate Studies* (242 Sociology-Psychology Building, West Campus); Associate Professor Cliff W. Wing, Jr., *Director of Undergraduate Studies* (316 Sociology-Psychology Building, West Campus)

Details concerning the program of studies in psychology may be obtained from the brochure *Graduate Studies in Psychology*.

First Term

92. Sensation, Perception, and Learning. Sensation, including psychophysics and receptor processes. The concept of reflex, both physiological (Sherrington) and behavioral (Pavlov). Complex organization: learning, perception, and cognition. 11:20-12:40. One course. *Guttman*

94. Personality. Representative theories of personality, from Freud to the present, emphasizing problems of normal personality structure, dynamics, development, and assessment. Not open to students who have had Psychology 116. 9:40-11:00. One course. *Kremen*

117. Statistical Methods in Psychology. Elementary statistical techniques and their application to the analysis and interpretation of psychological data. Theory of inference is stressed. Psychology majors only. 1:20-2:40. One course. *White*

152. Psychological Approaches to Contemporary Problems. Relevance of various psychological theories and findings to selected contemporary issues. Prerequisite: permission of the instructor. 8:00-9:20. One course. *Wortman*

Second Term

93. Biological Basis of Behavior. Behavior as a product of evolution and the role of behavior in species survival. Neural and endocrine factors in reproduction, hunger, thirst, emotion, and intelligence. Heredity-environment in the development of behavior. 9:40-11:00. One course. *Kalat*

138. Abnormal Psychology. Disordered behavior and constructive personality change are viewed in interpersonal and social context for purposes of understanding normal and abnormal personality development and functioning. Prerequisite: Psychology 94 or 95. 11:20-12:40. One course. *Lakin*

211. The Problem Child. (Also Education 211.) Study of problem behavior and adjustment in children, with emphasis on the causes and treatment of conduct and neurotic disorders of the maladjusted child. Particular attention will be paid to mental hygiene principles in the handling of problem children in school and home. 9:40-11:00. One course (3 graduate units). *I. Gehman*

253. Personality Development. A survey of behaviors and concepts relating to personality functioning with special emphasis on infancy, childhood, and adolescence. 8:00-9:20. One course (3 graduate units). *Carson*

Religion

Associate Professor Harry B. Partin, *Acting Chairman* (117-B Gray Build-

ing, West Campus); Professor Franklin W. Young, *Director of Graduate Studies* (209-A Divinity Building, West Campus); Associate Professor Orval S. Wintermute, *Director of Undergraduate Studies* (327 Gray Building, West Campus)

First Term

52. The New Testament. Origins, development and content of thought. 9:40-11:00. One course. *Price*

57. Introduction to the History of Religions. A historico-religious study of primitive religion, Hinduism, Buddhism, Islam, and some other religions. 11:20-12:40. One course. *Bradley*

106. The Mission and Message of Jesus. An analysis and interpretation of the Gospels. 8:00-9:20. One course. *Charlesworth*

154. Ethics and Modern Technology. Emerging ethical issues created by the impact of technology on the psychological, social, political, and economic life of modern man. 1:20-2:40. One course. *Clark*

Second Term

55. The Religion of the Bible. An historical, cultural, and theological study of the Old and New Testaments. 8:00-9:20. One course. *Osborn*

125. Religion and Theology of Black America. Black religion in its historical and social context, with critical appraisal of major works. 1:20-2:40. One course. *Burford*

155. Ethical Issues in the Life Cycle. Human development viewed in religious, ethical, and psychological perspectives. 11:20-12:40. One course. *McCollough*

156. Christian Marriage and the Family. Marriage and the family in American society studied from the Christian perspective. Attention will be given to the teachings of the churches and of psychologists and sociologists concerning courtship and marriage, sex, parent-child relationships, mixed marriages, and divorce. 9:40-11:00. One course. *Phillips*

Khirbet Shema^c Project

Joint Expedition of the Khirbet Shema^c Project, including the two religion courses listed below, will be offered during the second term. For special application forms write directly to Professor Eric Meyers, Department of Religion, Duke University, Durham, North Carolina 27706.

101. Principles of Archaeological Investigation. Supervised field work, visits to other excavations, introduction to ceramic chronology, numismatics, and other related disciplines. Excavation of the late Roman village of Khirbet Shema^c, Galilee. One course. *Meyers*

102. Palestine in Late Antiquity. The history, literature, and archaeology of Roman Palestine with particular emphasis on Galilee in rabbinic and early Christian times. One course. *Meyers*

Third Term

141. Religions of China and Japan. Confucianism, Taoism, Buddhism, Shinto, and other religious traditions of China and Japan. 9:40-11:00. One course. *Corless*

Romance Languages

Professor Marcel Tetel, *Acting Chairman* (205A Languages Building, West Campus); Associate Professor Patrick Vincent, *Director of Graduate Studies* (214 Languages Building, West Campus)

FRENCH

First Term

63. Intermediate French. Intensive classroom and laboratory practice in spoken and written patterns. Readings in contemporary literature. Prerequisite: French 1-2 or two years of high-school French. 8:00-9:20; Mondays and Thursdays, 2:00-3:20. One lab course. *Staff*

97. Conversational French. Intensive instruction in oral and written expression. Contemporary French prose provides the basis for vocabulary building and for practice in structural patterns. Prerequisite: French 64 or proficiency. 11:20-12:40. One course. *Steegar*

141. Studies in Myth and Legend. Transformations of mythical figures such as Orpheus, Phaedra, Don Juan from antiquity to modern times in forms ranging from tragedy to film. 9:40-11:00. One course. *Auld*

181. French. An intensive introduction to the language including modern readings. 9:40-11:00. One course. *Staff*

Second Term

64. Intermediate French. Continuation of French 63. 8:00-9:20; Mondays and Thursdays, 2:00-3:20. One lab course. *Bryan*

129. French Civilization. Contemporary France as seen through its history, institutions, customs, and arts. Readings and discussion in French. 1:20-2:40. One course. Graduate credit can be arranged. *Tetel*

182. French. An intensive introduction to the language including modern readings. 9:40-11:00. One course. *Staff*

SPANISH

First Term

63. Intermediate Spanish. Intensive classroom and laboratory practice in spoken and written patterns. Readings in contemporary literature. Prerequisite: Spanish 1-2 or two years of high-school Spanish. 9:40-11:00; Mondays and Thursdays, 2:00-3:20. One lab course. *Murray*

120. Cervantes, *Don Quixote*. Readings either in English translation or in Spanish. A comparatist approach, with reference both to the prose romances which preceded Cervantes' work and to the tradition of the novel which it helped to establish in England, France, and Spain. Graduate credit can be arranged. 1:20-2:40. One course. *Wardropper*

181. Spanish. An intensive introduction to the language including modern readings. 8:00-9:20. One course. *Staff*

Second Term

64. Intermediate Spanish. Continuation of Spanish 63. 9:40-11:00; Mondays and Thursdays, 2:00-3:20. One lab course. *Staff*

97. Spoken Spanish. Intensive instruction in the spoken language: contemporary Spanish prose provides the basis for vocabulary building, and for practice in structural patterns. Does not satisfy the minimum uniform requirement. Prerequisite: Spanish 64 or equivalent. 11:20-12:40. One course. *Landeira*

182. Spanish. An intensive introduction to the language including modern readings. 8:00-9:20. One course. *Staff*

Sociology and Anthropology

Professor Kurt W. Back, *Acting Chairman* (268 Sociology-Psychology Building, West Campus); Associate Professor John Wilson, *Director of Graduate Studies in Sociology* (328 Sociology-Psychology Building, West Campus); Assistant Professor Robert B. Hartford, *Director of Undergraduate Studies in Sociology* (250 Sociology-Psychology Building, West Campus); Assistant Professor William M. O'Barr, *Director of Graduate Studies in Anthropology* (264 Sociology-Psychology Building, West Campus); Assistant Professor Nancy Bowers, *Director of Undergraduate Studies in Anthropology* (263 Sociology-Psychology Building, West Campus)

The Department of Sociology offers graduate work leading to the A.M. and Ph.D. degrees. Before undertaking advanced work in this department, a student must have completed a minimum of 12 units of approved preliminary courses in the field, and 12 additional units in the field or in related work. A student who is deficient in the minimum required work will be asked to take additional undergraduate courses agreed upon in conference with the Director of Graduate Studies.

Candidates for advanced degrees in sociology usually take minor work in psychology, economics, political science, education, history, or religion. Detailed requirements for the minor work, and for majors in other departments who wish to present sociology as minor work, may be obtained from the Director of Graduate Studies.

SOCIOLOGY

First Term

91. Introduction to Sociology: Concepts and Procedures. Concepts and

procedures of sociology and illustrations of their use in understanding specific areas of social life. Open to freshmen. 11:20-12:40. One course. *Beach*

145. Urban Sociology. Historical, demographic, and ecological materials are used to study urban society with respect to its institutions, interaction patterns, differentiation, integration disorganization, and decentralization. 1:20-2:40. One course. *Beach*

Second Term

172. Collective Behavior and Social Movements. Examination of disruptive and relatively unorganized aspects of social phenomena such as crowd behavior, fads, rumors, crazes, and social movements as indexes of social disequilibrium and potential sources of social change. 9:40-11:00. One course. *Wilson*

259. Religion and Social Change. The role of religion in significant social changes in Western and non-Western societies; non-institutional phenomena (charisma, prophecy, messianism, revivals, glossolalia). Prerequisite: either Anthropology 264, Sociology 151, or the equivalent. 11:20-12:40. One course (3 graduate units). *Wilson*

Third Term

150. The Family. Analysis of the American family as an institutionalized group and its relationship with other institutions and structural features such as social class and ethnic group. Special attention is devoted to methods of research in this area. 8:00-9:20. One course. *White*

247. Community and Society. This course seeks to provide a frame of reference for the analysis and ordering of facts pertaining to the diverse cultures of the world, the State, the world community, the Great Society, news, mass behavior, social problems, races, and classes. 9:40-11:00. One course (3 graduate units). *Borinski*

255. Race and Culture. A comparative study of race relations in world perspective developed around such themes as race and personal identity, the geography and ecology of race relations, the idea of race, and race conflict. 11:20-12:40. One course (3 graduate units). *Borinski*

ANTHROPOLOGY

First Term

94. Cultural Anthropology. A study of the dynamics of culture and society; form and function of social institutions. Emphasis is upon primitive societies. 8:00-9:20. One course. *P. Winther*

130. Cultural Change and Stability. Contemporary theories of culture change, especially those resulting from acculturation and from implementation of programs of technical and economic aid; a consideration of the factors signification in maintaining stability of stimulating change in traditional cultures. 9:40-11:00. One course. *J. Winther*

Second Term

93. General Anthropology. Origins and distribution of mankind; primate evolution; a survey of human paleontology and human biology, prehistory and language; and the origins of human social organization and culture. 1:20-2:40. One course. *Huntington*

264. Primitive Religion. The ethnology, social functions, and the socio-psychological meanings of religion in primitive societies. 9:40-11:00. One course (3 graduate units). *Huber*

Third Term

137. Comparative Social Organization. Social anthropological analysis of role structures and corporate groups in particular societies, and their relevance for understanding the historic process of civilization. Case study of social types and of the unique features of societies revealed by the comparative method. Prerequisite: Anthropology 94 or permission of the instructor. 9:40-11:00. One course. *Huber*

Zoology

Professor Donald J. Fluke, *Chairman* (227 Biological Sciences Building, West Campus); Associate Professor Stephen A. Wainwright, *Director of Graduate Studies* (024 Biological Sciences Building, West Campus); Associate Professor Calvin L. Ward, *Director of Undergraduate Studies* (032 Biological Sciences Building, West Campus)

The Department of Zoology manages a variety of programs tailored to individual needs of students seeking B.A., B.S., M.A., or Ph.D. degrees.

Students seeking undergraduate degrees should consult the *Bulletin of Undergraduate Instruction* for a statement of major requirements. A departmental handbook available from the office of the Director of Undergraduate Studies describes the advising system, typical courses of study, special programs, and interests and background of the faculty.

In general, a graduate student entering the department will be equipped to pursue an advanced degree if he has completed an undergraduate major in biology, along with some formal training in college-level chemistry, mathematics, physics, and foreign languages.

Nevertheless, in recognition and support of the modern trend toward interdisciplinary research, the department is prepared to accept promising students with less orthodox academic backgrounds and is ready to encourage any student wishing to undertake a program of study leading, in effect, to an interdisciplinary degree sponsored by the department.

Thus, all students are urged to search widely in the *Bulletin of Undergraduate Instruction* and the *Bulletin of the Graduate School* for information about the intellectual resources of the University. Special attention, perhaps, should be given to announcements of the Departments of Anatomy, Biochemistry, Botany, Chemistry, Geology, History, Mathematics, Microbiology and Immunology, Philosophy, Physics, Physiology and Pharmacology, Psychology, Sociology and An-

thropology, and Zoology; announcements of the Schools of Engineering and Forestry should also be consulted.

For registration dates see General Registration, page 29 of this *Bulletin*. For detailed instructions and further information on the offerings at Beaufort, see the *Bulletin of the Duke University Marine Laboratory*.

First Term (Durham Campus)

151L. Principles of Physiology. An introductory survey. Prerequisites: introductory college biology and a year of chemistry. Laboratory included. 9:40-11:40. Laboratory 2:00-5:00 Monday, Wednesday, and Friday. One course. *Lutz*

191T. Independent Study. For senior and junior majors with permission of the Director of Undergraduate Studies and the supervising instructor. *Staff*

353. Research. Hours to be arranged. 2-6 units. *Staff*

First Term (Duke Marine Laboratory, Beaufort)

191T. Independent Study. For senior and junior majors with permission of the Director of Undergraduate Studies and the supervising instructor. *Staff*

353. Research. Hours to be arranged. 2-6 units. *Staff*

Second Term (Durham Campus)

71. Heredity and Society. An introduction to genetics, with emphasis on the effects of environment and heredity upon the individual and population. A student may not receive credit for both Zoology 71 and 180. Prerequisite: introductory college biology or consent of the instructor. 9:30-11:10. One course. *Ward*

192T. Independent Study. For senior and junior majors with permission of the Director of Undergraduate Studies and the supervising instructor. *Staff*

354. Research. Hours to be arranged. 2-6 units. *Staff*

Second Term (Duke Marine Laboratory, Beaufort)

192T. Independent Study. For senior and junior majors with permission of the Director of Undergraduate Studies and the supervising instructor. *Staff*

203L. Marine Ecology. Class discussions on selected papers, and field projects; practice in scientific writing and use of computers in ecology. Prerequisites: a course in general zoology, invertebrate zoology, or an appropriate equivalent, and a year of mathematics; some knowledge of statistics will be helpful. Two courses (6 graduate units). *Sutherland*

214L. Biological Oceanography. Composition in time and space of marine biosphere in relation to descriptive marine chemistry, physics, and geology. Some work at sea aboard the research vessel. Prerequisites: a course in invertebrate zoology, ecology, marine biology or an appropriate equivalent, chemistry through organic, and one year of physics and mathematics. Two courses (6 graduate units). *Barber*

276L. Comparative and Evolutionary Biochemistry. Lectures and discussion of the origin of life, evolution of the genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Prerequisite: consent of the instructor. (Also listed as Biochemistry 276). Two courses (6 graduate units). *Sullivan*

278L. Invertebrate Embryology. Lectures, readings, and laboratory work dealing with rearing, development, and life history of invertebrates. Prerequisite: courses in vertebrate embryology and/or invertebrate zoology. Two courses (6 graduate units). *Bookhout*

354. Research. Hours to be arranged. 2-6 units. *Staff*

Third Term (Durham Campus)

191T. Independent Study. For senior and junior majors with permission of the Director of Undergraduate Studies and the supervising instructor. *Staff*

353. Research. Hours to be arranged. 2-6 units. *Staff*



Third Term (Duke Marine Laboratory, Beaufort)

191T. Independent Study. For senior and junior majors with permission of the Director of Undergraduate Studies and the supervising instructor. *Staff*

212L. Marine Membrane Physiology. Physiology of marine and estuarine organisms, with emphasis on cellular transport and electrophysiological processes. The course will include laboratory work on functions, mechanisms, and comparative aspects of ionic and osmotic regulation in marine plants and animals. Prerequisite: permission of instructor. (Also listed as Physiology 212). Given at Beaufort. Two courses (6 graduate units). *Gutknecht and Others*

250L. Physiological Ecology of Marine Animals. A study of the physiological responses of marine animals in relation to certain environmental factors and evolution. Animals representing numerous phyla from various habitats are studied. Prerequisite: a course in physiology. Lectures and laboratories. Two courses (6 graduate units). *Forward*

274L. Marine Invertebrate Zoology. Structure, functions, and habits of invertebrate animals under normal and experimental conditions. Field trips included. A student may not receive credit for both 274 and 275. Prerequisite: introductory college biology. Two courses (6 graduate units). *Staff*

353. Research. Hours to be arranged. 2-6 units. *Staff*

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Information to Accompany Duke University Summer Session Residence Hall Application

Application for room and apartment reservations and all correspondence concerning reservations should be addressed as appropriate to: Department of Housing Management, House D, Room 101-R, Duke Station, Durham, North Carolina 27706, or Business Manager, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Room rent is payable in advance. No deductions from grants, scholarships, etc., can be made to pay rents.

Room and apartment assignments will be made only upon the applicant's admission to the summer session, as certified by the Summer Session Office, and *upon payment of full rent*. Applicants who expect to be in residence for longer than one term of the summer session are urged to make advance reservation for the entire period and thus avoid, to the extent that housing arrangements make it practicable, the necessity of moving from one room to another during the full term of residence.

See page 24 of the *Bulletin of the Summer Session* for information concerning refund of fees.

When no single rooms are available, a person requesting a single room will be assigned a double room alone and charged room rent as stated on the next page.

Requests for specific roommates will be complied with, provided the completed application forms of both applicants indicate mutual agreement and are on hand in the Department of Housing Management at the time of room assignment. If the applicant requests a double room but gives no preference of roommate, the Department of Housing Management will try to assign a roommate.

**Please Retain This Sheet
See Reverse**

Residence Hall Rooms—Rates

UNDERGRADUATE AND GRADUATE RESIDENCE HALLS

Few and Edens Quadrangles

Single	Double
15 weeks—\$292.50	15 weeks—\$217.50
10 weeks—\$195.00	10 weeks—\$145.00
9 weeks—\$175.50	9 weeks—\$130.50
8 weeks—\$156.00	8 weeks—\$116.00
5 weeks—\$ 97.50	5 weeks—\$ 72.50
4 weeks—\$ 78.00	4 weeks—\$ 58.00
1 week —\$ 19.50	1 week —\$ 14.50

TOWN HOUSE APARTMENTS (GRADUATE STUDENTS)*

\$20.00 each student per week (3 to an apartment).

\$30.00 each student per week (2 to an apartment).

*Not assigned for less than four weeks. Air-conditioned. Special rates will be quoted for families. A \$50 residential deposit is required of families occupying Town House Apartments.

DUKE UNIVERSITY MARINE LABORATORY

Each Term, Per Person

Double Room (Non-Air-Conditioned)	\$57.00
Double Room (Air-conditioned)	\$72.00
Triple Room (Air-conditioned)	\$52.00

Refund of Room Rent

There will be a refund of room rent upon the following conditions:

- When notification for a housing cancellation is received by the Department of Housing Management on or before 20 days prior to the first day of scheduled classes of each summer session term, full room rent will be refunded.
- When notification for a housing cancellation is received between the twenty (20) days prior to the first day of scheduled classes and the first four class days, 80 percent of the room rent will be refunded.
- When notification for a housing cancellation is received after the first four days of summer session term, 70 percent of the room rent for the unused period will be refunded.

Duke University Summer Session: Application for Housing

Please Print

Male ☐

Graduate ☐

Name

Female ☐

Undergraduate ☐

Mailing

Permanent

Address

Address

Present position

City

Anticipated fields of study: (1)

(2)

Accommodations Desired

Room: Single Double

Duke Marine Laboratory Only: Triple

Town House Apts.: Unaccompanied Students

No. Persons

(Available for graduate students and families only)

Name of roommate(s) preferred:

Number of weeks enrolled

Date of arrival at Duke

At Beaufort

Enclosed is check/money order payable to *Duke University* in amount of \$

(Total payment required with application. No assignments will be made until full remittance is received. Please ensure that your remittance covers the specific number of weeks you will be in residence.)

*A \$50 residential deposit is required of families occupying Town House Apartments.

Mail completed application and check as appropriate to:

Department of Housing Management

Duke University, Duke Station

Durham, North Carolina 27706

Business Manager

Duke University Marine Laboratory

Beaufort, North Carolina 28516

Signature

Directions to Summer Session Applicants

All applicants for Summer Session courses who are not now in residence at Duke University must fill out accurately and in detail the form below and return it to the Director of the Summer Session. Preference in enrollment will be given to persons returning the form promptly, but a place in a particular course cannot be assured until all fees are paid. Undergraduates or graduates who are enrolled in a university or college other than Duke University and who are seeking to transfer summer session credits to the college in which they are matriculated should request a course approval form to be certified by their dean or registrar. Graduate students are reminded that credit earned as an unclassified graduate student cannot be applied toward an advanced degree at Duke University. Persons applying for admission to the Graduate School of Duke University should write the Dean of the Graduate School for the necessary forms in addition to completing the form below.

No. _____ Approved _____ Date

Application for Enrollment in the Duke University Summer Session

Mr., Mrs., Miss
(Please Print)

Street Address, Rural Route, or P. O. Box

Post Office State Zip Code

Social Security No.

Please register me in the following courses listed in the *Bulletin of the Summer Session*.

Department	No. of Course	Title of Course
.....
.....
.....
.....

Name and address of high school from which you graduated

Have you attended a college? Yes No

Name and address of college

Highest degree held

Are you a candidate for a degree? Yes No

If yes, for which degree?

Check the one below which indicates your present University status. (Do not indicate a status in a Duke University School or College unless you have already been admitted to that School or College)

Undergraduate credits

- ☐ Trinity College (men)
- ☐ The Woman's College
- ☐ School of Engineering
- ☐ Special or unclassified
- ☐ Credits for transfer

Graduate credits

- ☐ Graduate School
- ☐ Divinity School
- ☐ School of Forestry
- ☐ Special or unclassified
- ☐ Credits for transfer

Are you applying for admission to the Graduate School?

Are you at present a college student? If so, where?

..... What class?

Are you a full-time teacher?

If so, give name and address of school

Teaching Position:

Elementary:

Secondary:

Administrator:

Supervisor:

Have you attended previous Summer Sessions at Duke? Yes

Years No

Do you wish credit certified to some agency or school?

Yes: No:

If yes, please give exact name and address of agency or school.

.....
.....

MAP OF DUKE UNIVERSITY

East Campus

A Baldwin Auditorium
B Bassett House
C Brown House
D Union Building
E Faculty Apartments
F Art Museum, Geology
G Aycock House
H East Duke Building
I West Duke Building
J Jarvis House
K Carr Building
L Giles House
M Woman's College Library
N Alspaugh House

O Pegram House
P Duke Press
Q Infirmary
R Ark
S Crowell Building
T Epworth Inn
U Gilbert-Addams House
V Southgate Hall
W Campus Center
X Woman's College
Gymnasium
Y Asbury Building
Z Bivins Building
AA Art Building
BB Branson Building



West Campus

A Duke Chapel
B Divinity School
C Gray Building
D Perkins Library
E Language Center
F Old Chemistry Building
G Davison Building
School of Medicine

H Hospital Main Entrance
I Gerontology, D & T,
Clinical Research
J Duke Hospital
K Sociology, Psychology
L Social Sciences
M Allen Building
N Few Quadrangle

O Craven Quadrangle
P Wannamaker Hall
Q Crowell Quadrangle
R Clock Tower Court
S Kilgo Quadrangle
T Union Building
U Flowers Building
Page Auditorium

V Card Gymnasium
W Indoor Stadium
X School of Law
Y Gross Chemical Laboratory
Z Biological Sciences
AA Plant Environment
Laboratory
BB Physics Building
CC Nuclear Laboratory
DD School of Engineering
EE Army Research
FF Medical Center Research
Buildings
GG Nanaline H. Duke Medical
Sciences Building
HH Warehouse, Shop
II Bell Building
JJ Hanes House
School of Nursing
KK Hanes House Annex
LL Pickens Rehabilitation
Center
MM Graduate Center
Alumni House
NN Commonwealth Studies
Center
PP Personnel Office
QQ International House
RR Personnel Office
SS Education Improvement
Program.
A Better Chance Program
TT International Studies
Center
UU Campus Stores Office
VV Office of Institutional
Advancement
WW Information Services
Visitors Bureau
XX Admissions Office
YY Edens Quadrangle
ZZ Wade Stadium



BULLETIN OF DUKE UNIVERSITY
Summer Session

Vol. 44 No. 6 January 1972

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The Graduate School



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To the Prospective Graduate Student at Duke University

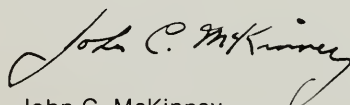
Several years ago a committee of distinguished scholars was appointed and asked to appraise the state of graduate education at Duke University and indicate guidelines for its future development. I would like to quote briefly from the preamble of their report:

The primary role of a university is to provide a focus for the growth of ideas. Since ideas grow in the minds of men, communication between scholars, between faculty and students—in short, teaching—is the first basic function of a university. But without great ideas to communicate—ideas old and new, traditional and nascent—teaching is an exercise in futility. Therefore, the second basic function of a university must be research, characterized by the spirit of free inquiry and the exploration, analysis, and synthesis of ideas. These two faces of a university are complementary.

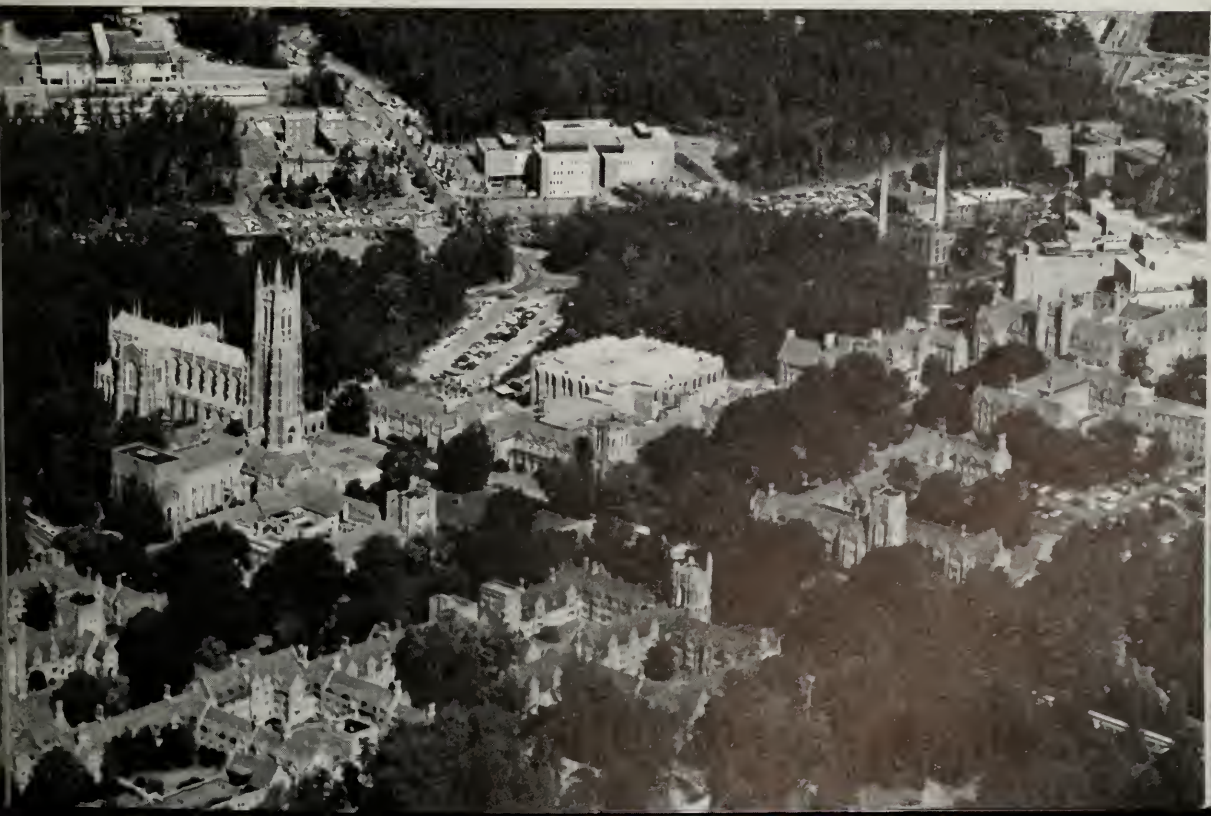
Even in the undergraduate college or in the professional school, the student

learns best when moved by a spirit indistinguishable from the mood of the scholar engaged in original research. The ideas taught are, in fact, new to the student and therefore fit material for his "original" research. But it is in the graduate school that teaching and research become truly inseparable.

To the student in search of a superior graduate education, Duke University has much to offer: excellent research facilities such as an outstanding library, a major computing center, modern laboratories—but above all, a highly productive graduate faculty dedicated to the twin functions of teaching and research. The following pages, and the information they contain, are addressed to the student seeking a soundly based graduate education.



John C. McKinney
Dean of the Graduate School



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*Term expires September, 1972.



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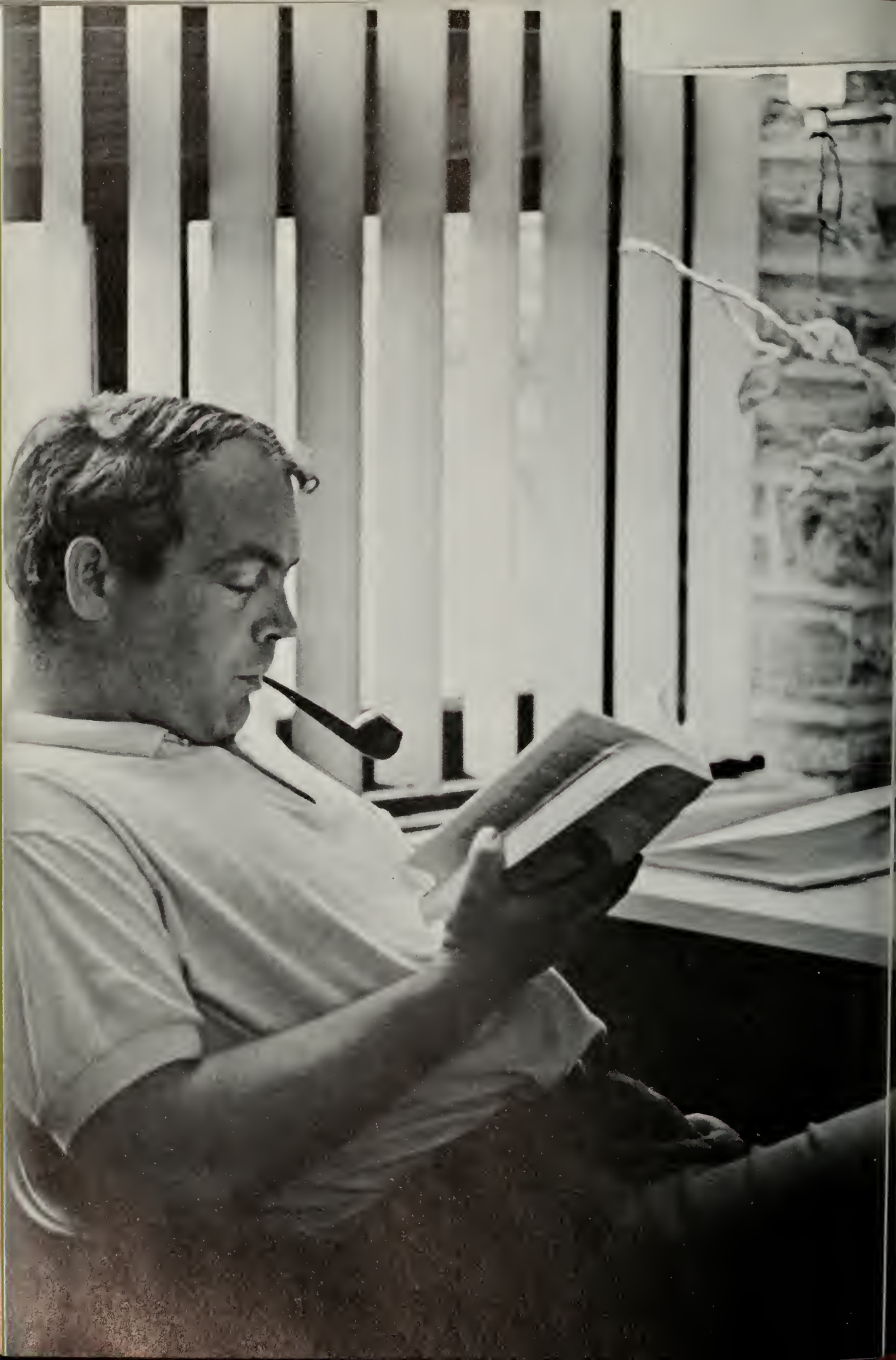
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Introduction

Writing in the 1920's, the philosopher and man of science Alfred North Whitehead described the goal of higher education in these terms: "The task of a University is the creation of the future." It is only ninety years since the founding of the first formally organized graduate school in the United States, but it has become most evident that graduate schools, through their training of teachers, researchers, industrial specialists, scientists, and government advisers, play one of the most vital roles in "the creation of the future."

Ideally, a graduate school is a community of scholars—apprentice, initiate, and master—engaged in imparting and extending the realm of man's knowledge in the arts and sciences. A select group of students is admitted each year to undergo the rigorous discipline of an advanced degree program, the successful among them to emerge as scholars of promise. To enter upon graduate education today is to accept a real challenge, but the decision should not be made lightly or casually. The work toward a doctorate involves several years of tireless effort and possible sacrifice, and the material rewards may be less certain or less bountiful than in some alternative occupation. Pursued with

determination, however, graduate education may be the doorway to a stimulating, creative, and meaningful life—a life which few persons who have chosen it would exchange if they had the opportunity of reliving their student years.

The student who is contemplating this challenge usually has many questions in mind; the following pages are an attempt to answer some of them. Many of the comments are applicable to programs at any university for a variety of degrees, although emphasis is placed here on the graduate programs at Duke University.

Should I Go to Graduate School?

This question can ultimately be answered only by the questioner himself. The decision to work toward an advanced degree must be a personal commitment born of a real willingness to devote oneself to many months or possibly years of hard intellectual work just at the age when one may be impatient for financial independence and freedom from academic discipline. Graduate education requires all the energy, enthusiasm, and self-discipline at one's disposal; to enter upon it half-heartedly is to invite discouragement or failure.

An equally important requisite for success in graduate study is the possession of a keen and disciplined intellect. Of this it can only be said that "the proof of the pudding is in the eating." A good undergraduate record may or may not be adequate evidence of ability. Many a student with an excellent undergraduate record has been unsuccessful in graduate study, because his undergraduate training stressed an ability to marshal facts and to articulate these facts rather than real understanding and analysis of material. On the other hand, many distinguished scholars had undistinguished undergraduate records. It may be of some comfort to remember that Einstein had difficulty in mastering simple mathematics (although one should be certain that he is another Einstein before using this fact as an easy excuse). In gaining

admission to a graduate school, the undergraduate record is of course an important element, but usually some margin is left to allow for the student who develops a serious academic interest only at a late stage. The student himself is often better able to judge whether his grade record is a true gauge of his ability or represents an under-par performance.

If a student feels he has both the ability and a strong desire to accept the challenge, he should not let other obstacles unduly influence his decision. About two thirds of current students enrolled in Ph.D. programs in American universities have sufficient financial support from universities, industries, or foundations to meet the minimum cost, and most universities have loan provisions to help the student without adequate resources. Today about 60 percent of graduate students are married, and a majority of students' wives work part or full time during their husbands' periods of residence. Indeed, many wives pursue an advanced program concurrently.

There is no certain way of knowing in advance whether one will be successful or happy in graduate school; in this regard it differs little from any other career path one may choose to follow. It is quite likely, however, that if one has both the motivation and the ability and does not try it, there will be regrets in later years. Although this must be an individual choice, superior intellectual ability is a scarce human resource, and its encouragement and utilization are areas of national as well as personal concern.

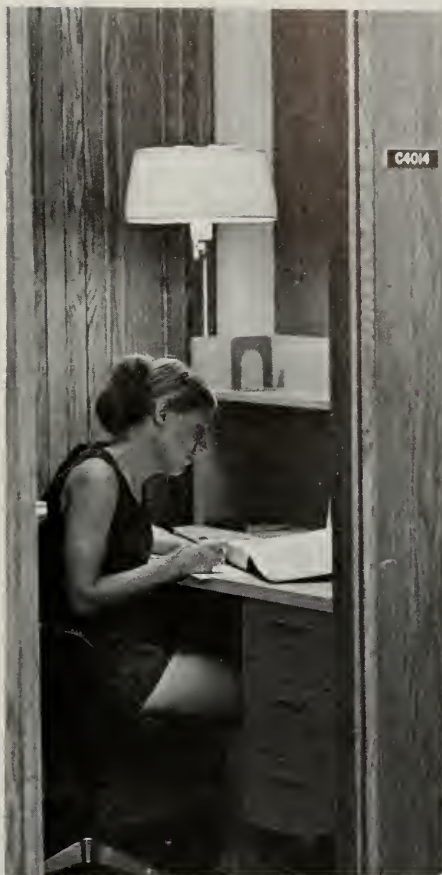
How Should a Graduate School Be Chosen?

Over two hundred and fifty universities today offer work leading to the Ph.D. degree. Among these are about sixty institutions which grant only two or three such degrees a year in all fields combined. At the other end of the scale are about forty universities which account for nearly 70 percent of all doctorates granted in this country. Duke University is among these latter, as are most of the major institutions which

offer work of quality ranging across a breadth of academic disciplines. But even if one can narrow the field to about forty major institutions, how does one select among these, and what factors should affect one's final choice? A few key factors are briefly discussed below.

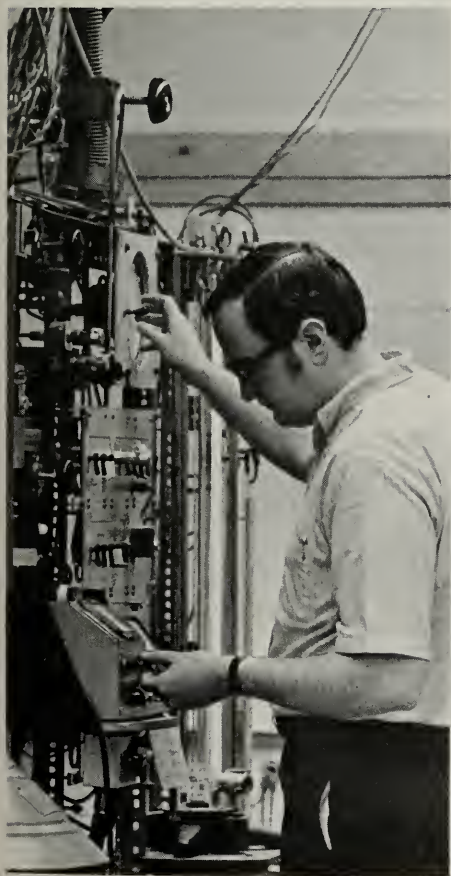
Size. Size is not an infallible guide to the quality of a graduate school. There are a number of poor graduate schools of exceedingly large size, and a number of extremely good small ones. There are advantages, however, in attending a university which has attained a certain level of size, although it is difficult to provide a magic number to use as a yardstick. It is simpler to mention a few of the disadvantages of too many or too few students.

An extremely large graduate school—and there are a few today which have between six and twelve thousand



enrolled—is a rather far cry from the ideal of a small number of superior students working closely in intellectual pursuits with a few esteemed scholars. Classes of fifty to a hundred students, inaccessibility of senior faculty, shortage of library materials and facilities, only a nodding acquaintance with fellow students—these are only a few of the possible drawbacks. A very able student may develop well even in such an atmosphere of mass production, but this situation is hardly the ideal.

An extremely small graduate school also has its disadvantages. Most of the classes are likely to be mixed undergraduate-graduate classes, where a student is not surrounded by many other good students who will help to sharpen his powers and create an atmosphere conducive to learning. Also, facilities are often very limited, and the faculty is likely to be primarily com-



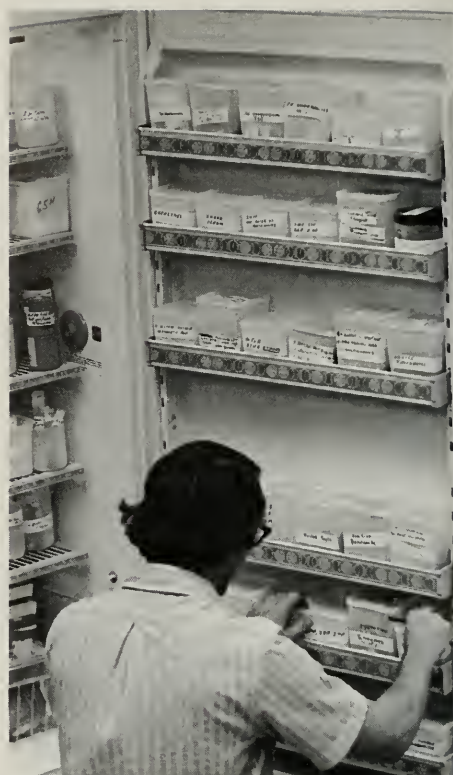
posed of undergraduate instructors. A university must be willing to commit a significant portion of its resources to develop a graduate program of high quality, and this is often not the case in an extremely small graduate school.

More important than the size of the entire graduate school is the size of the particular departmental program in which a student is interested. An optimum doctoral program will have an enrollment of perhaps thirty to one hundred students, admitting fifteen to forty new students each year, and turning out perhaps three to ten Ph.D.'s per year. Information on enrollment or degrees conferred is usually available in university catalogues or government publications on higher education, and a prospective student may find it useful to compare enrollments in various institutions before choosing a school.

Duke University is firmly committed to programs of moderate size where the interests of the student are paramount. Total enrollment in the Graduate School is about 1,700 students. Between four and five hundred new students are admitted each year from approximately four thousand applications. Only four departments have more than eighty students; seventeen departments have enrollments that fall within the optimum range suggested in the preceding paragraph.

Quality. Not only do universities differ considerably in their reputation for quality, but there are marked differences among departments within any university. Harvard, for example, is a great university because it has many reputable departments, not because it is best in every category. On the contrary, many excellent universities have a few weak departments in which a student would fare less well than he might in an excellent department in a less esteemed institution. Therefore, the student should not be guided solely by the reputation of a university as a whole, but should inquire more specifically about the area in which he wishes to specialize.

Since judging the quality of a graduate program is necessarily subjective, no two people are likely to be in complete agreement. The prospective stu-



dent would do well to talk with his professors in his undergraduate college, particularly those who have themselves achieved some reputation in the world of scholarship. As witnessed by their own continuing writing and research, they are more likely to have reliable information on the merits of various graduate programs. Similarly, the younger faculty member who is only four or five years out of graduate school may have more recent acquaintance with his and other schools.

Another yardstick to quality, albeit an imperfect one, may be the occasional questionnaires asking other educators to rank various graduate departments. In the most recent American Council on Education report, of the 23 Duke graduate programs evaluated, 13 were rated as "distinguished" or "strong," eight were rated as "good," and two were rated as "adequate plus."

None of these guides is adequate in itself, but taken in conjunction with individual advice and recommendations they may help the student in his selec-

tion. An extremely good student can obtain a good graduate education in a number of universities, but in such an important choice it pays to be as well informed as possible.

The best procedure is to take many factors into account in choosing where to apply for admission, and then make application at the three or four schools one would most like to attend. (Applying at fifteen universities is merely a waste of an applicant's and the universities' time.) It is wisest not to make a final selection solely on the basis of financial aid available, on the advice of a single friend or adviser, or on a university's past prestige. One should get as much current information as one can. Write to the graduate school or the departmental director of graduate studies if further information is desired; visit the university in person, if possible; and carefully weigh the advice of the more distinguished faculty members of one's undergraduate college.

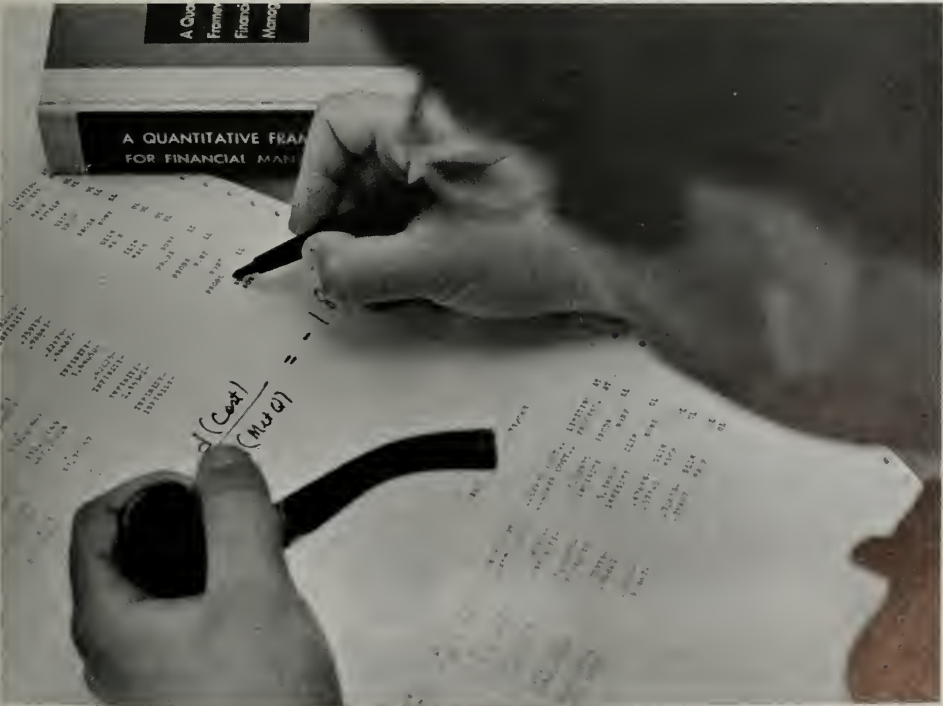
How Long Will It Take?

One of the primary questions in the mind of every student considering grad-

uate study is "how long will it take?" This is not an easy question, however, for the answer depends partly on the requirements of the student's program, partly on the student himself, and partly on the attitude in the graduate school and the department in which he is studying.

The student's level of preparation before entering graduate school has a direct bearing on the speed with which he can progress toward a degree. One who enters with proficiency in one or more foreign languages and a good foundation in his chosen subject area may well be able to finish within the minimum time limits. On the other hand, the less well prepared student may find that one and a half to two years are the minimum for the A.M., and four to five years for the Ph.D. (although wise use of the summers may reduce this time somewhat). The total time may also be lengthened if the student must work during part of his period of residence. (More on this subject will be found below, under "How Can I Pay for It?")

The attitude of the graduate school and its various departments will also



affect the time needed to complete the degree. During the last decade the average time elapsing between entering graduate school and receiving the doctorate in American universities has been about ten years. A study of experience at Duke during the early 1950's indicated that the average doctorate in the humanities required a little over seven years, nearly six years in the social sciences, and slightly over four years in the sciences. Over the last few years, however, Duke University has been among the forerunners in reducing the time needed to obtain the Ph.D. without any sacrifice in quality. This effort has taken the form of trying to eliminate the unnecessary delays, particularly those due to financial burdens on the student. Duke ranks among the leading institutions in the country today in terms of financial aid per student from university sources. Moreover, most of this aid is in the form of fellowships and scholarships which do not require burdensome services in return. The large public institutions are often more restricted to awards which require substantial teaching, research, or other duties, thus reducing the speed with which a student can complete his resident course work. A student will be wise to inquire to what extent his progress toward a degree may be delayed by the work entailed in certain awards. If, for example, an assistantship lengthens unduly the time necessary to obtain a degree, even a smaller fellowship may be preferable.

Another way in which Duke encourages deliberate speed toward fulfilling degree requirements is through its tuition charges. Many graduate schools charge tuition for three full years in a doctoral program. In 1958 Duke adopted the policy of charging full tuition and fees only up to the time the doctoral student passes his preliminary examination. (This examination is taken upon completion of all course and language requirements, normally at the end of the second year, before the student is formally admitted to candidacy for the Ph.D.) After "prelims," tuition charges are substantially reduced. In making his choice of a graduate school, a prospective student should inquire about the fees for a full doctoral program,

not merely the charges for the first year. The tuition and fee system at Duke has worked to encourage both the student and his department to arrange for preliminary examinations to be taken before the beginning of the third year. Some years ago fewer than half of the doctoral students at Duke took this examination before the beginning of the third year; today over 90 percent are doing so. This plan, aided by liberal scholarship and fellowship aid, gives the graduate student at Duke a marked advantage over his counterparts in many other graduate schools in acquiring his degree in the minimum amount of time.

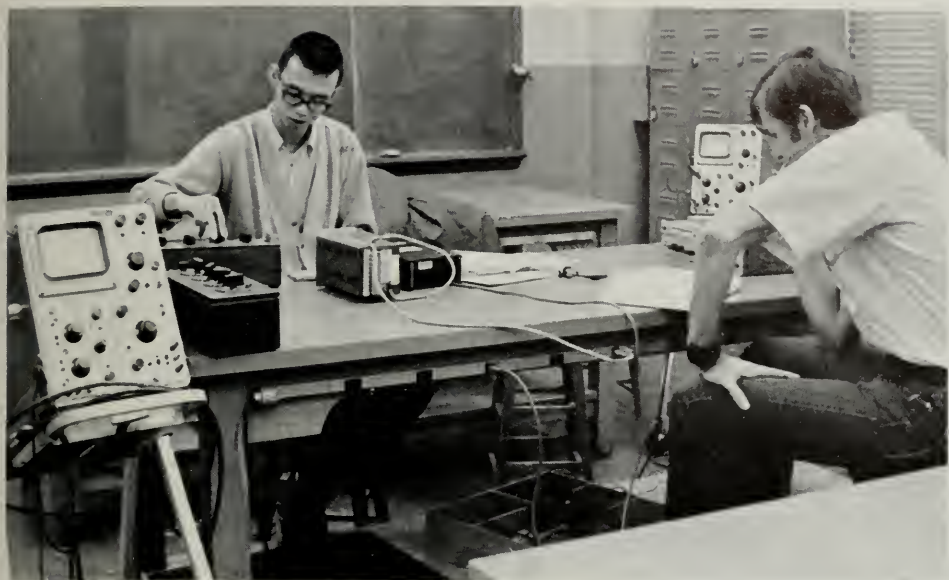
How long it will take to obtain an advanced degree, therefore, depends on many factors, but the policy of the Duke Graduate School is to keep time at a minimum and consistent with continuing quality in its graduate program.

How Can I Pay For It?

The typical entering graduate student, after completing his four-year undergraduate program, may not be able to continue with support from his family or from part-time earnings. All graduate schools, in order to minimize financial barriers for superior students, have at least modest funds at their disposal in the form of scholarships, fellowships, or assistantships. Few private universities have sufficient funds to aid more than half of their graduate students and often make total awards which are considerably greater than their entire tuition income from such students.

In recent years at Duke about 80 percent of all full-time students have held an award of some type; about one third of these were aided by Duke funds and the other two thirds by funds from other sources.

The student who seeks financial aid from the graduate school of his choice should be certain that he files his request for admission and award at a sufficiently early date. An application should be completed not later than February 15 of the year in which September admission is sought. At Duke, the student's application, including transcripts of his previous college work



and letters of recommendation, is processed by the Graduate School and forwarded to the department in which he wishes to pursue advanced work. The graduate faculty—or admissions committee—in the department reviews all applications and then makes its recommendation to the Dean for announcement in late March. The most outstanding applicants are then offered awards; the next in order of rank are placed on an alternate list for awards. Other students whom we want to attend are offered only admission to the Graduate School. Because of multiple applications by students, a fraction of the awards offered by any graduate school are turned down by students who finally decide to go elsewhere. Alternates on the award list are immediately notified, and the process continues until the desired number of awards has been made.

The determining factors in the student's position in these rankings are the letters of recommendation, the undergraduate record, and (if required) pre-entrance test scores on the Graduate Record Examination. The quality of some capable applicants is not always evident according to these criteria, although they may turn out to be excellent students after admission. Often part-time jobs, extracurricular activ-





ities, lack of seriousness of purpose at an early age, or similar factors make a student's undergraduate record a poor gauge of his capabilities. The Graduate School, however, must judge as best it can from limited information, admittedly making occasional errors in judgment. Letters of recommendation usually weigh heavily when the writer is a scholar held in high esteem by the faculty of the school to which application is made.

Entering graduate school for the first year without an award will not prejudice one's chances for a later award. In the spring of the first year, the graduate faculty reviews the progress of all current award holders and weighs the applications of others. Awards for the second and third years are made almost entirely as a result of the student's record in the graduate program. Thus, it is often a wiser course in the long run to enter a good graduate school without an initial award than to go to a less attractive school with modest financial aid.

Awards to entering students at Duke are in the form of fellowships, scholarships, and assistantships.

James B. Duke Graduate Fellowships are provided through a special endowment of the Duke Endowment. Fellows are chosen from nominations made by the departments. Only outstanding applicants who are beginning graduate study and seeking the Ph.D. degree are considered. These nominations are made in late February and are judged in a competition which includes all departments granting the Ph.D. degree. These fellowships provide for payment of tuition for full registration and stipend of \$290 per month for the full calendar year during the first two years and for the academic year during the third (final) year. The award requires no service beyond that which is required of all students in a given department as a part of their training and is renewable each year upon satisfactory progress. The total value of the award is \$5,760 for each

of the first two years. The total value of a James B. Duke Fellowship over the full three years of tenure is) \$14,652.

Graduate Fellowships range in value from about \$2,400 for the academic year to \$5,150 for the calendar year and are made on a year-to-year basis. They are awarded upon recommendation by each department. No service is required as a prerequisite for accepting a fellowship, but all fellowship holders are expected to maintain full-time registration.

Scholarships provide for payment of tuition or partial tuition. Full tuition scholarships are valued at \$2,160 for the academic year. Scholarships are awarded upon recommendation of each department.

Graduate Assistantships range in value to \$4,350 for the academic year. Assistantships normally require services of the student up to twelve hours a week and permit the student to register for a four-fifths course load. Assistantships are most common in the science departments, where the student often provides laboratory assistance to various members of the faculty. Most graduate assistants remain in residence for at least one of the summer sessions during their first two years, carrying sufficient research or course credit so that they can complete their residence requirement of 60 units within two years. In this way, the normal progress toward a degree is not impeded by the reduced load during the fall and spring semesters. Departmental research funds are often available to provide financial assistance during the summer.

In addition to the graduate awards from University funds, other fellowships are available from foundations, industry, or the government. Among those at the University's disposal are James B. Duke Commonwealth fellowships for students in political science, economics, and history, concentrating their studies on the British Commonwealth; Kearns fellowships in religion; Ford Foundation fellowships in economic development; Lilly Foundation fellowships in political science; C. W. Hargitt research fellowships in zoology; and Cokesbury awards

for the preparation for college teaching. Duke University also offers fellowships under the National Science Foundation Traineeship program. In 1971-72 there were 84 students holding three-year fellowships awarded by Duke under Title IV of the National Defense Education Act. Another four students held Foreign Language Fellowships awarded by Duke University under Title VI of the National Defense Education Act in Southeast Asia Area Studies. A number of other traineeships and assistantships are available in the biological, physical, and social sciences under grants from AEC, NASA, National Science Foundation, National Institutes of Health, the United States Public Health Service, and other governmental agencies.

Loan funds are also available for students who do not have sufficient resources at their disposal. Loans may be obtained either from the National Defense Act Loan fund or from University funds. These carry low interest charges and easy repayment terms. Further information may be obtained from the Student Loan Division of the University.

It is difficult to estimate a student's financial needs during the years of graduate study because of individual tastes and habits. One can predict with some accuracy, however, the three major items of expense at Duke: tuition, \$2,160 for a full program for each of the first two years, normally \$432 for the Ph.D. dissertation year; room rent, \$340-\$450 each year in graduate dormitories; and board, approximately \$700-\$750 in graduate dining halls. Students holding awards are normally paid in nine equal installments beginning in late September, and tuition and room fees may be deducted monthly on a pro rata basis.

The costs of graduate education are high, but Duke University attempts to allocate its funds so that the superior student is able to finish his work for a degree in the normal length of time regardless of his personal financial resources. This is a contribution to the community of scholarship which the University is glad to bear.





Duke University Graduate School

In surveying the progress made in the first seven years after the founding of Duke University, its first President, William Preston Few, wrote that he wanted "to see the Graduate School made strong because it will best and most quickly insure our attaining and maintaining a place of real leadership in the educational world." President Few believed that "more than anything else here our Graduate School will determine the sort of University we are to build and its standing in the educational world." These opinions have continued to prevail to the present day, with emphasis upon the interdependence of teaching and research as the necessary components of scholarship.

Over four hundred members of the graduate faculty teach the approximately five hundred courses and seminars offered in the Graduate School, and supervise thesis and dissertation research. Many of the major universities of the world have helped to train this faculty; approximately 90 percent of the graduate staff hold degrees from the forty-one institutions which make up the Association of Graduate Schools within the Association of American Universities. By place of birth they represent almost every state in the Union and almost two dozen foreign countries.

The seventeen hundred graduate students currently enrolled represent a similar diversity in background. Approximately 48 percent of the students recently completing degrees are from undergraduate colleges in the Southeast, 18 percent from the Middle Atlantic states, 11 percent from the Central states, 5 percent from New England, 5 percent from the Far West, 3 percent from the Southwest, 2 percent from the Northwest, and 10 percent from foreign countries. The old maxim that a university is only as good as its faculty might be amended by adding "and no better than its student body." No professor can give his wisdom to a student, and no student can take his understanding to another. This must be a reciprocal process between professor and student, and between student and student. The groundwork for learning may be laid in privacy—indeed a certain amount of private study and research is absolutely essential—but the vital stimulus to the learning process comes from one's contact with the minds of other men with similar or related interests. This is precisely why graduate schools are highly selective in their admissions policy, and it is one of the important reasons for their willingness to offer attractive fellowship awards to outstanding students. The superior student is a valuable catalyst both for his fellow students and for his faculty, and is prized as such.

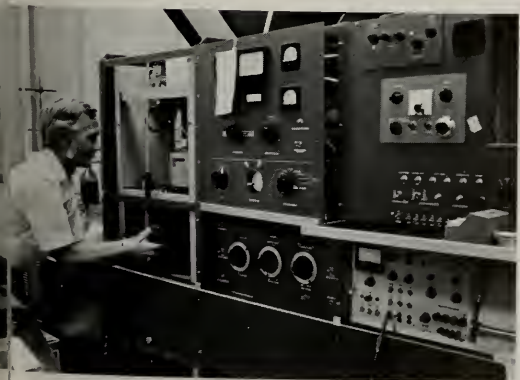
Faculty and students comprise the essential human factors in education, but their joint endeavor cannot prosper without adequate research and library facilities. Duke University is particularly fortunate in regard to research facilities, for the physics, botany, zoology, chemistry, psychology, sociology, engineering, and biochemistry laboratories have been built entirely within recent years, and modernization and expansion have occurred in other scientific areas. The University shares a magnificent computing facility with the University of North Carolina and North Carolina State University. The Triangle Universities Computation Center is among the largest research-oriented computer facilities in the world. It is also the University's pride that it has one of the finest research libraries, the

twentieth largest university library in the nation today, second in the South, and first in the Southeast. In number of volumes, breadth of coverage, serials, and documents, it is a much more adequate library than that available in many graduate schools with enrollment two or three times as large. To the student in the arts, humanities, and social sciences, for whom the library is the bloodstream of scholarship, this is an immeasurable asset.

Among the many special features of the Graduate School a few important examples may be mentioned. For students in the biological sciences, the facilities of the Duke Marine Laboratory at Beaufort, North Carolina, are available for course work and research. The Laboratory has research buildings, classrooms, motor vessels (including the 118-foot oceanographic ship, the *R/V Eastward*), and living quarters, which make it one of the best research centers in marine biology in the country. Closer to home are the 8,000 acres of the Duke Forest, managed by the School of Forestry, ideal for research on timber growth, soils, and related topics. A large phytotron has recently been completed. Students in both the physical and the life sciences frequently avail themselves of the facilities of the Oak Ridge Institute of Nuclear Studies, of which Duke is one of the sponsoring universities.

In the social sciences the Center for Commonwealth Studies is internationally recognized for its graduate training and research program. The center is a cooperative enterprise of the Political Science, Economics, and History Departments. Other important graduate programs with an international orientation focus on Europe, South Asia, Sub-Saharan Africa, and South America. These involve sociology and anthropology in addition to the other social sciences.

Other special teaching or research programs include the Program in Christianity and the Social Order, jointly conducted by the Departments of Political Science and Religion; the Program in Population Studies, conducted by the Departments of Sociology and Economics; the Social Systems Simulation Program, jointly sponsored by all the



social sciences; the Program in Aging and Human Development, primarily based in Sociology, Psychology, and Psychiatry; The General Motors Institute Bachelor-Masters Plan; and numerous others such as the cooperative programs with the University of North Carolina in the humanities. Duke is also fortunate in having excellent Medical, Law, Engineering, Forestry, and Divinity Schools on its main campus, thus making additional facilities available for course or research work related to the graduate curricula in the arts and sciences. A three-term summer session and the availability of courses in the nearby University of North Carolina and North Carolina State University under a cooperative arrangement offer other opportunities to the graduate student.

No description of programs can begin to give the prospective student the full flavor of graduate study in a particular institution. A visit to the universities in which one is particularly interested may be helpful in giving one a better picture. If this should be practical, the Duke Graduate School offers a warm invitation to prospective students to come to the campus during the year to discuss their possible application and admission. The visitor will find at Duke most of the facilities that one could hope for in the largest of institutions, and yet the University has been fortunate in avoiding many of the evils inevitable with mass education. Despite the total University enrollment of approximately 8,000, Duke has retained the sense of community that one usually associates with a smaller liberal arts college. And in an age when current architectural whim often adds yet one more variant style to an already assorted array of buildings, Duke has built with foresight and design a campus of unusual beauty. This, too, is an important part of the fabric of education, creating an environment conducive to learning.

General Regulations Governing Graduate Studies

The official detailed *Bulletin of the Graduate School*, published in February of each year, gives a detailed account of regulations concerning grad-

uate work at Duke University and a full description of course content. The following pages are a summary of these materials for 1972-73 and should provide sufficient information for the prospective student. The *Bulletin* is normally mailed to each student who is admitted to the Graduate School in the late spring of the year of matriculation so that he may plan his course program for the first year. Copies may be obtained in February, however, by writing to the Graduate School Office, Duke University, Durham, N.C. 27706.

Admission

All applicants will be considered without regard to race, color, religion, sex, or national origin.

Admission is required of (1) all students who intend to pursue study toward a degree offered by the Graduate School, (2) all other students who desire credit for whatever purpose for graduate courses—except students who register as Special Students in the Summer Session. Students who have discontinued a program of study after earning a master's degree here must by letter request permission of the Dean to undertake a doctoral program.

A student seeking admission to the Graduate School of Duke University must have received an A.B. or B.S. degree (or the equivalent in the case of foreign students) from an accredited institution. His undergraduate program should be well rounded and of such quality as to give positive evidence of capacity for graduate study. Normally he should have majored in the area of his intended graduate study. Many departments (see the section on Advanced Degree Programs at Duke) list specific prerequisites. Students are urged to anticipate the language requirement and are reminded that Educational Testing Service Graduate School Foreign Language tests in French, German, Russian, and Spanish are offered to undergraduate and graduate students at many centers on nationally uniform dates (see the section on Language Requirement).

A student seeking admission to the Graduate School should request the Dean of the Graduate School to send

an application blank. This should be filled out completely and returned promptly. In addition the student should provide the following supporting documents; (1) two copies of a transcript or transcripts of all his undergraduate and graduate work mailed directly by the registrar to the Dean; (2) as soon as possible, two supplementary transcripts showing completion of work in progress when the earlier transcript was made; (3) three letters of recommendation, written on the forms provided, by persons best qualified to judge him as a prospective graduate student and mailed directly to the Dean; and (4) scores on the Graduate Record Examination as indicated in the table below.

All applicants except former students in the Graduate School must include the application fee of \$15.00 in check or money order payable to Duke Uni-

versity. Applications will not be processed unless this fee has been received.

Scores on the Graduate Record Examination, particularly the Aptitude Test, are strongly recommended in all departments and must be submitted if the test has been taken. Scores on the Graduate Record Examination may be requested of any applicant whose record is marginal and must be submitted by all applicants for a fellowship. *Students applying for financial aid should take the Graduate Record Examination no later than December in order to meet the February 15 deadline.* Information on times and places of Graduate Record Examinations can be provided at the applicant's college or by the Educational Testing Service, Princeton, New Jersey 08540, or Berkeley, California 94704. Departments that require scores of all applicants are listed below.

Graduate Record Examination

Departments or Programs	Aptitude	Advanced
Anatomy	x	
Anthropology	x	
Biochemistry	x	x
Botany	x	x
Business Administration ¹		
Chemistry	x	x
Classics	x	
Computer Science		
Economics	x	x
English	x	x
Forestry	x	
Geology	x	
German	x	
History	x	
Mathematics	x	
Microbiology	x	x
Pathology	x	x
Philosophy ²	x	
Physical Therapy	x	
Physics	x	x
Physiology	x	x
Political Science	x	
Psychology	x	
Religion	x	
Romance Languages	x	x
Sociology	x	x
Zoology	x	x

¹Applicants to the Graduate School of Business Administration are required to take the Admission Test for Graduate Study in Business, administered by the Educational Testing Service.

²If the candidate does not already hold a doctoral degree he will be required to take the GRE.

Fully qualified students from outside the United States are welcome to take courses in the Graduate School and, in many instances, to study toward a degree. In applying for admission the foreign student must, in addition to the information required of all students, submit with his application (1) if his native language is not English, certification of his proficiency in English demonstrated by submitting scores from the Test of English as a Foreign Language (TOEFL), administered through The Educational Testing Service in Princeton, New Jersey, or, if he is in the United States, a statement of his English proficiency written by a professor of English at his university; (2) a statement showing financial arrangements for the proposed term at Duke (estimated costs per academic year are \$3,800); and (3) a statement by a qualified physician describing any emotional or physical illness the applicant has had during the previous five years. A foreign student must meet all these requirements before the Graduate School will make any offer of admission.

All foreign students whose native language is not English will be examined during their first registration period for competence in the use of oral and written English. Until competence is determined, admission and arrangements for an award involving teaching must remain provisional. Students found to lack the necessary competence will be required to enroll in the non-credit course called English for Foreign Students and to reduce their course or research program by 3 units.

A student who does not successfully complete this course during the first year of his residence will not be permitted to continue his program. Passing this examination or the course, if it is required, will not meet degree requirements for a foreign language.

When admission is approved, the student will receive a letter of admission and an acceptance form. *The process of admission is not complete until the acceptance form has been returned.*

Applicants who are admitted will be offered full admission, provisional admission, or non-degree admission. Provisional admission is offered to students who appear to warrant admission but do not fully comply with admission requirements. It is offered for a trial period of one semester or 12 units of course work. Non-degree admission is offered to students who (1) have no intention of taking an advanced degree at Duke University but wish to take courses for accreditation for transfer to other institutions, or for other purposes, or (2) do not fully meet admission requirements but wish to further their academic interests. Graduate credit earned under provisional status may be applied toward an advanced degree at Duke University if and when the student is granted full admission; graduate credit earned under non-degree status may not be applied toward an advanced degree at Duke University. (See ruling on page 20).

It is the applicant's responsibility to make certain that his application is completed and in order before the dates specified. Because applications cannot be reviewed until all supporting documents are filed, applications should be submitted at least two weeks before the closing dates listed below.

We encourage all candidates to apply by February 15. Anyone whose folder is not complete before that date will face the possibility that the enrollment in his department will have been filled. While the Graduate School Office will process later applications, it will not guarantee full consideration of a folder for any department after April 15.

Fall semester, admission and award	February 15
Fall semester, admission only	July 15
Spring semester, admission only	December 1
Summer session 1973, First term*	May 14
Summer session 1973, Second term*	June 18
Summer session 1973, Third Term*	July 23

*Students seeking admission to the Graduate School for study in the summer session should apply to the Dean of the Graduate School and to the Director of the Summer Session.

Earning the Degrees

Duke University offers graduate programs leading to the specified advanced degrees in the following fields:

Anatomy, A.M., Ph.D.	Germanic Languages and Literature, A.M.
Anthropology, A.M., Ph.D.	History, A.M., Ph.D.
Art, A.M.	Hospital Administration, M.H.A.
Biochemistry, A.M., Ph.D.	Mathematics, A.M., Ph.D.
Biomedical Engineering, M.S., Ph.D.	Mechanical Engineering, M.S., Ph.D.
Botany, A.M., Ph.D.	Microbiology and Immunology, A.M., Ph.D.
Business Administration, M.S.*, M.B.A., Ph.D.	Pathology, A.M., Ph.D.
Chemistry, A.M., Ph.D.	Philosophy, A.M., Ph.D.
Civil Engineering, M.S., Ph.D.	Physical Therapy, M.S.‡
Classical Studies, A.M., Ph.D.	Physics, A.M., Ph.D.
Computer Science, A.M.	Physiology, A.M., Ph.D.
Economics, A.M., Ph.D.	Political Science, A.M., Ph.D.
Education, M.Ed., M.A.T., A.M., Ed.D., Ph.D.	Psychology, A.M., Ph.D.
Electrical Engineering, M.S., Ph.D.	Religion, A.M.,§ Ph.D.
English, A.M., Ph.D.	Romance Languages, A.M., Ph.D.
Forestry, A.M.,† M.S., Ph.D.	Sociology, A.M., Ph.D.
Geology, A.M.	Zoology, A.M., Ph.D.

* Applicants should write directly to the Graduate School of Business Administration for further information.

† In addition to the regular advanced degrees in the Graduate School, the School of Forestry offers the professional degrees of Master of Forestry and Doctor of Forestry.

‡ Prospective applicants should write directly to the Department of Physical Therapy, Box 3247, Duke University Medical Center, Durham, N.C. 27706, for further information.

§ In addition to the regular advanced degrees in the Graduate School, the Divinity School offers the professional degrees of Master of Divinity, Master of Religious Education, and Master of Theology.



Programs leading to graduate degrees include course and seminar study prescribed by the individual departments. Evidence of command of and training in the tools of research (for example, foreign languages); guided and independent reading and laboratory and field experience; a period of residence with constant easy access to the library, laboratory, senior professors, and other graduate students; certain oral and written examinations to exhibit command of the declared field of study; and a master's thesis or doctoral dissertation as a public account of a body of knowledge the student has mastered. (In some departments it is possible to earn an A.M. degree without presentation of a thesis by completing additional course work or other equivalent academic exercises.) A final examination, generally focused upon the thesis or dissertation, enables the student to convince the graduate staff that he has fulfilled all the requirements of his program. Time limitations are set for completion of the program so that the initial ambition in undertaking graduate study and the momentum of accomplishment are not lost.

The Language Requirement

Although individual departments establish their own minimal requirements (see individual departmental headnotes in this *Bulletin*), the regulations of the Graduate School require no language for the master's degree, and, in most departments, a reading knowledge of one foreign language, ancient or modern, for the Ph.D. degree. The languages normally required are French, German, and Russian, but others may be offered if appropriate and approved. The foreign language requirement may be satisfied in the following ways: (1) by a passing score on one of the ETS examinations administered at any national center (including Duke) and taken no longer than six years before the preliminary examination, (2) by transfer from another institution, with the limitations set forth in the *Bulletin of the Graduate School*, (3) in any language for which ETS tests are not available, by a reading examination administered by a qualified examiner and arranged by the

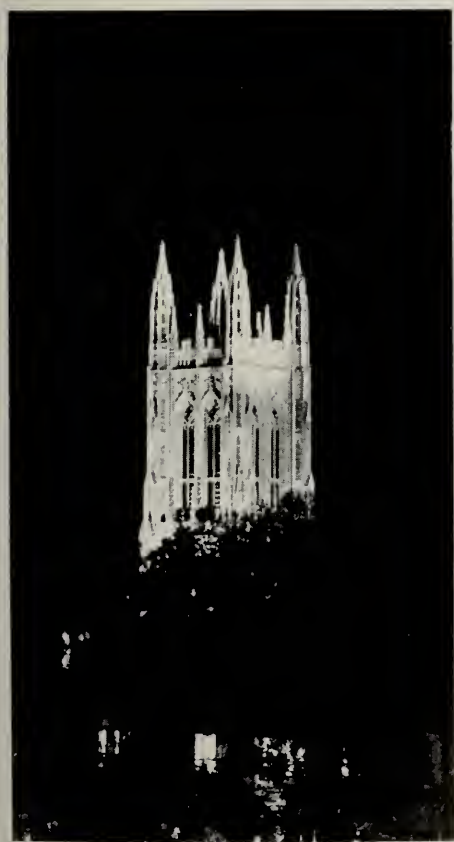
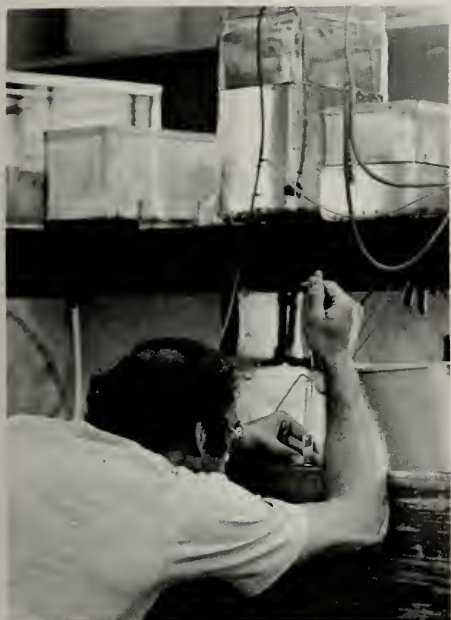


Graduate School Office, or (4) by a reading examination in any foreign language, administered by a qualified member of the faculty under a procedure specified by the department and approved by the Dean and the Executive Committee of the Graduate Faculty. In special circumstances a department that wishes to do so may ask the Dean and the Executive Committee of the Graduate Faculty to waive the language requirement.

Foreign students whose native language is not English will be examined during their first registration period in their use of English, and those found deficient will be required to enroll in the course entitled English for Foreign Students. Advanced level, non-credit reading courses in French and German are provided for students who need them.

Other Requirements

The general requirement for a master's degree is a *minimum* of 30 units (semester hours) of course-seminar-research credit. The student must present acceptable grades for a minimum of 24 units of graduate courses. The nature of the additional 6 units for which he must register de-



depends on whether he is enrolled in a thesis or non-thesis program; i.e., these last 6 units are earned either with successful submission of the thesis or with such other courses or academic exercises as are approved by the student's department. In the M.A.T. program, practice teaching is included for students who lack it, and for them the total units required is a minimum of 36. A pattern of major and related work is prescribed for the course-seminar work, allotting half or more of the units to the major. For example, the M.Ed. allows at least half the units to fall within the student's teaching field, and the M.A.T. allows a major in either education or teaching fields, according to the student's previous training.

A master's program can be completed in one academic year, but the student who presents a thesis normally needs at least a calendar year, and foreign students should be prepared to study for two years. The maximum span of time permitted from first registration to completion of all requirements is six years. Under certain circumstances a maximum credit of 6 units may be transferred toward the master's degree for graduate courses completed elsewhere, provided the grades earned in the particular courses were not less than *B* or equivalent. In such a case, however, the transfer of graduate credit does not reduce the required minimum registration for a master's degree at Duke.

The course-seminar-research requirement in the doctoral program is a *minimum* of 60 units, but the proportions of course-seminar work and research are generally flexible according to the student's needs. The applicant who has already earned the A.M. or M.S. (or for a degree in religion, the B.D. or M.Div.), after establishing the quality

of his work here, may be granted transfer credit to a *maximum* of 30 units, i.e., the equivalent of one year of residence. The dissertation is expected to be a mature and competent piece of writing, embodying the results of original and significant research. All dissertations will be published on microfilm, and the author may retain copyright privileges.

Fairly strict time limitations are set for completion of the doctoral program. The preliminary examination, which may be taken only after language and course-seminar requirements have been met, and which formally admits a student to candidacy for the degree, should be passed by the end of the third year of doctoral study. The interval between preliminary examination and presentation of an acceptable dissertation should normally be one to two years and may not be more than four years without special approval by the Dean. Should this interval extend beyond five years, a second preliminary examination normally becomes necessary.

Financial Regulations

Tuition and fees are charged at the rate of \$72.00 per unit (a unit is equivalent to a semester hour), with the normal full program of study being 30 units for an academic year. Upon successful completion of the preliminary examination and at least 60 units of course-seminar-research credits, the normal full program during the dissertation period is 3 units per semester while in residence, or 1 unit per semester while not in residence. The basic necessary expenses for a year of graduate study, assuming one lives in University graduate dormitories, are therefore approximately as follows:

	<i>First and Second Year</i>	<i>Dissertation Year</i>
Tuition	\$2,160	\$432
Room Rent*	340	340
Board†	700	700

*Depending upon accommodations chosen.

†Cafeteria estimate

Additional allowances should be made for books, laundry, and other personal expenditures.

Housing is provided for approximately 149 single men and 56 single women in the Graduate Center. The Town House Apartments, located between East and West Campuses, will accommodate three women in each of 30 air-conditioned apartments.

Since no married student housing facilities are available, the University provides assistance to married graduate and professional school students in locating suitable housing in Durham.

Information on fellowships, scholarships, assistantships, and loan provisions is summarized in the section, "How Can I Pay for It?"

The applicant who wishes further information on facilities and regulations on course programs not covered in this *Bulletin* is invited to write to the Director of Admissions of the Graduate School, or the director of graduate studies in the department of intended study.



Calendar of the Graduate School

Summer Session 1972

- First Term: May 15-June 16
- Second Term: June 19-July 21
- Third Term: July 24-August 25

Academic Year 1972-73

- First Semester: September 5-December 6
- Second Semester: January 15-April 23

September 1	Registration for First Semester
September 5	Classes Begin
November 22-24	Thanksgiving Recess
December 7-13	Reading Period
December 21	End of First Semester
January 13	Registration for Second Semester
January 15	Classes Begin
March 19-23	Spring Recess
April 24-30	Reading Period
May 8	End of Second Semester
May 13	Commencement





Advanced Degree Programs*

Anatomy

The Department of Anatomy offers graduate programs designed to produce teachers and research workers competent in a broad range of anatomical sciences; both A.M. and Ph.D. degrees are offered. Students with a wide variety of backgrounds and interests in the biological sciences can be accommodated. All students participate in a core anatomical sciences course (Anatomy 301) and gain experience in teaching over the range of departmental interests. Students are encouraged to round out their formal course work by drawing upon the offerings of other departments in the University, as well as those in the Anatomy Department. Laboratories within the department are equipped for and actively support research in several areas, including biochemical and biophysical cytology, biological motility, cell biology, developmental biology, endocrinology, neurobiology, physical anthropology, membrane structure and function, and primate biology. Further information may be obtained from the Director of Graduate Studies of the department.

Professors

John Buettner-Janusch, Ph.D. (Michigan); John Wendell Everett, Ph.D. (Yale); J. Moses, Ph.D. (Columbia); Talmadge Lee Peele, M.D. (Duke); J. David Robertson, M.D. (Harvard), Ph.D. (MIT), *Chairman*.

Associate Professors

Kenneth Lindsay Duke, Ph.D. (Duke); William Longley, Ph.D. (London); Michael K. Reedy, M.D. (Washington).

Assistant Professors

Mark Adelman, Ph.D. (Chicago), *Director of Graduate Studies*; Jan Bergeron, V.M.D. (Pennsylvania); Matthew Cartmill, Ph.D. (Chicago); Sheila J. Counce, Ph.D. (Edinburgh); Harold Erickson, Ph.D. (Johns Hopkins); William C. Hall, Ph.D. (Duke); Miriam J. Jacobs, Ph.D. (Alabama); Kurt E. Johnson, Ph.D. (Yale); Moses S. Mahaley, M.D., Ph.D. (Duke); James Shafland, Ph.D. (Chicago).

*(For full course descriptions including credit and name of instructor see the official detailed *Bulletin of the Graduate School*.)

Courses of Instruction

- | | |
|---|---|
| 208. Anatomy of the Trunk | 284. Tutorial in Developmental Biology |
| 210. Introduction to Human Structure | 286. Optical Methods in Biophysical Cytology |
| 219. Molecular and Cellular Basis of Development | 288. The Cell in Development and Heredity |
| 219S. Seminar | 290. Membrane Structure |
| 231. Human Evolution I | 291. Special Topics in Nerve Ultrastructure |
| 232. Human Evolution II | 300. Gross Anatomy |
| *233-234 Comparative Anatomy of the Primates | 301. Gross Human Anatomy, Microscopic Anatomy, and Neuroanatomy |
| 236. Human Genetics | 303. Neuroanatomical Basis of Behavior |
| 238. Functional and Evolutionary Morphology of Primates | 312. Research |
| 244. Topics in Cell Structure and Function | 313-314. Anatomy Seminar |
| 261. History of Generation and Mammalian Reproduction | 333. Primate Evolution |
| 263. History of Anatomy | 334. Topics in Physical Anthropology |
| 264. Mammalian Embryology and Developmental Anatomy | 340. Tutorial in Advanced Anatomy |
| 271. Comparative Neurology and Psychology | 344. Advanced Neuroanatomy of Sensory and Motor Mechanisms |
| 280. Molecular Basis of Anatomy | 354. Research Techniques in Anatomy |
| | 403. Endocrinology and Reproduction |

*Not offered in 1972-73.

Art

A graduate program leading to an A.M. degree in art history has recently been approved by the Graduate School. For further information, please write to the Director of Graduate Studies, Sidney D. Markman, 234 Social Science Building, Duke University, Durham, N.C. 27706.

Professors

Dario Covi, Ph.D. (New York), *Chairman*; Louise Hall, Ph.D. (Radcliffe); William S. Heckscher, Ph.D. (Hamburg); Sidney David Markman, Ph.D. (Columbia), *Director of Graduate Studies*; Elizabeth Read Sunderland, Ph.D. (Radcliffe).

Lecturer

Karla Langedijk, Ph.D. (Amsterdam).

Courses of Instruction

- | | |
|-------------------------------------|---|
| 217. Aegean Art | 251-252. Research |
| 218. Early Greek Art | 253. Studies in Italian Renaissance Sculpture |
| *233. Early Mediaeval Architecture | 254. The Art of Andrea del Verrocchio and its Influence |
| *234. Romanesque Sculpture | 255,256. Iconological Problems |
| *239. Architecture of Britain | 291-292. Museology Seminar |
| 240. Architecture of North America | |
| 241. Problems in Latin American Art | |

*Offered on demand.

Asian Languages

- 200-201. Special Studies in South Asian Languages: Hindi-Urdu

Biochemistry

Graduate work in the Department of Biochemistry is offered leading to the Ph.D. degree. Preparation for such graduate study may take diverse forms. Undergraduate

majors in chemistry, biology, mathematics, or physics are welcomed, but adequate preparation in chemistry is essential. Graduate specialization areas include protein structure and synthesis, enzyme action, and metabolism.

Professors

Mary L. C. Bernheim, Ph.D. (Cambridge); Samson R. Gross, Ph.D. (Columbia), *Director of the Genetics Division*; Irwin Fridovich, Ph.D. (Duke); Walter R. Guild, Ph.D. (Yale); Philip Handler,* Ph.D. (Illinois); Robert Hill, Ph.D. (Kansas), *Chairman*; Henry Kamin, Ph.D. (Duke); Norman Kirshner, Ph.D. (Pennsylvania State); Kenneth S. McCarty, Ph.D. (Columbia), *Director of Graduate Studies*; Charles Tanford, Ph.D. (Princeton); James B. Duke Professor of Physical Biochemistry.

*On leave of absence.

Associate Professors

Stanley H. Appel, M.D. (Columbia); Jerome S. Harris, M.D. (Harvard); Bernard Kaufman, Ph.D. (Indiana); William Sanford Lynn, M.D. (Columbia); Robert E. Webster, Ph.D. (Duke).

Assistant Professors

Ronald C. Greene, Ph.D. (California Institute of Technology); Robert L. Habig, Ph.D. (Purdue); Dwight H. Hall, Ph.D. (Purdue); Philip D. Harriman, Ph.D. (California); William N. Kelley, M.D. (Emory); Sung-Hou Kim, Ph.D. (Pittsburgh); Nicholas Michael Kredich, M.D. (Michigan); P. A. McKee, M.D. (Oklahoma); K. V. Rajagopalan, Ph.D. (University of Madras); Jacqueline A. Reynolds, Ph.D. (Washington Univ.); David C. Richardson, Ph.D. (MIT); Harvey J. Sage, Ph.D. (Yale); Lewis M. Siegel, Ph.D. (Johns Hopkins); James B. Sullivan, Ph.D. (Texas); Robert W. Wheat, Ph.D. (Washington Univ.).

Associates

John A. Bittikofer, Ph.D. (Purdue); Yasuhiko Nozaki, Ph.D. (Tokyo Univ.).

Courses of Instruction

- | | |
|--|--|
| 204. Introductory Genetics | 284. Current Topics in Genetic Mech- |
| 208. Laboratory Methods in Biochemistry | anisms |
| 209-210. Independent Study | 286. Current Topics in Immunochemistry |
| 216. Molecular Genetics | 288. The Carbohydrates and Lipids of |
| 219. Molecular and Cellular Basis of De- | Biological Systems |
| velopment | 290. Bioenergetics |
| 219S. Optional Seminar offered in con- | 293. Macromolecules |
| junction with Biochemistry 219 | 294. Nucleic Acids and Macromolecular |
| 222. Protein Crystallography | Synthesis |
| 241. General Biochemistry | 295. Enzyme Mechanisms |
| 247. Introductory Biochemistry | 296. Biological Oxidations |
| 276. Comparative and Evolutionary | 297. Intermediary Metabolism |
| Biochemistry | 298. Regulation of Cellular Metabolism |
| 280. Biochemistry of Development | 345,346. Biochemistry Seminar |
| 282. Experimental Genetics | 351,352. Genetics Seminar |

Botany

Graduate work in the Department of Botany is offered leading to the A.M. and Ph.D. degrees. Before undertaking graduate study in botany a student should have had in his undergraduate program at least 12 semester hours of botany beyond an elementary course, and related work in biological sciences. Some work in chemistry and physics will be desirable and, for some phases of botanical study, a necessity. Graduate Record Examination scores are required of all applicants. The student's graduate program is planned to provide a broad basic training in the various fields of botany, plus intensive specialization in the field of the research problem.

Professors

Lewis Edward Anderson, Ph.D. (Pennsylvania); William Dwight Billings, Ph.D. (Duke), *James B. Duke Professor of Botany*; William Lewis Culberson, Ph.D. (Wisconsin); Henry

Hellmers, Ph.D. (California at Berkeley); Terry W. Johnson, Ph.D. (Michigan); Paul Jackson Kramer, Ph.D. (Ohio State), *James B. Duke Professor of Botany*; Aubrey Willard Naylor, Ph.D. (Chicago); Jane Philpott, Ph.D. (State Univ. of Iowa); Donald E. Stone, Ph.D. (California at Berkeley); Robert L. Wilbur, Ph.D. (Michigan), *Chairman*.

Associate Professors

Richard B. Searles, Ph.D. (California at Berkeley); Boyd R. Strain, Ph.D. (California at Los Angeles), *Director of Graduate Studies*; Richard A. White, Ph.D. (Michigan).

Assistant Professors

Janis Antonovics, Ph.D. (Wales); John E. Boynton, Ph.D. (California at Davis).

Lecturer

C. F. Culberson, Ph.D. (Duke).

Courses of Instruction

- | | |
|--|--|
| 205. Anatomy | 251. Physiology |
| S205. Introductory Marine Microbiology | 252. Plant Metabolism |
| 209. Lichenology | 254. Plant-Water Relations |
| 210. Bryology | 255. Plant Systematics |
| S211. Marine Phycology | *257. Principles of Plant Distribution |
| *212. Phycology | 258. Physiology of Growth and Development |
| 213. Survey of Modern Botany I | *259. The Environment |
| 214. Survey of Modern Botany II | 265. Physiological Plant Ecology |
| 221. Mycology | 266. Analysis and Classification of Vegetation |
| 225-226. Special Problems | 280. Principles of Genetics |
| 235. Field Botany | 283. Developmental and Cellular Genetics |
| 242. Systematics | 285. Population Genetics and Evolution |
| 243. Cytology | 359-360. Research in Botany |
| 245. Plant Diversity | |
| 246. Ecology | |
| 250. Plant Biosystematics | |

*Not offered in 1972-73.

Business Administration

The Graduate School of Business Administration offers work leading to the M.B.A., Ph.D., and the M.S. in Management Sciences. The M.B.A. program is designed for students whose undergraduate work included at least one year of calculus and an educational background adequate for rigorous analysis. Normally, undergraduate majors in such fields as the physical and biological sciences, mathematics, engineering, and the social sciences are well suited for the program. The M.B.A. program is designed to provide a thorough foundation in the concepts and theory that underlie the design, operation, and control of modern complex organizations.

The Ph.D. program is designed for students who desire to enter either the academic profession or advanced and specialized administrative research positions. The doctoral level course work presumes either a Duke M.B.A. or the equivalent. One year of study (30 semester hours) beyond completion of the Duke M.B.A. degree or its equivalent is planned for each doctoral candidate. The year of study should include two courses in advanced economic theory, two courses in mathematics or statistics, one course in philosophy of science, and three courses in an elected field of administration. The latter are individually designed and are offered on a tutorial basis to provide extensive reading in the historical and current literature, and a demanding research program.

The requirements of the Graduate School are applicable to students in the Ph.D. program in business administration.

Professors

Helmy H. Baligh, Ph.D. (California at Berkeley); Thomas F. Keller, Ph.D. (Michigan); Louis D. Volpp, Ph.D. (State Univ. of Iowa).

Associate Professors

Joseph Battle, Ph.D. (Michigan); Richard M. Burton, D.B.A. (Illinois); David C. Dellinger, Ph.D. (Stanford); Louis R. Pondy, Ph.D. (Carnegie Institute of Technology).

Assistant Professors

William W. Damon, Ph.D. (Cornell); Steven F. Maier, Ph.D. (Stanford); Russell J. Petersen, Ph.D., C.P.A. (Washington).

Courses of Instruction for the M.B.A.

First Year Requirements

- | | |
|--|---|
| 300-301. Managerial Theory of the Firm | 321. Management of Information and Control Systems II |
| 310. Foundations for Quantitative Analysis I | 330-331. Organization Theory and Management |
| 311. Foundations for Quantitative Analysis II | 341. Macroeconomic Analysis |
| 320. Management of Information and Control Systems I | |

Second Year Requirements

- | | |
|---|--|
| 302. Cooperative Decisions and Competitive Strategies | 332. Organization Design and Internal Operations |
| 303. Cooperative-Competitive Relations and Decisions | 349. Law as a Constraint for Business |
| 312. Operations Research | 350. Public Policy of the Firm |
| | 390. The Practicum |

Electives

- | | |
|---------------------------------------|-----------------|
| 313. Advanced Operations Research | 351. Finance |
| 323. Controllership | 353. Marketing |
| 324. External Reporting and Auditing | 355. Production |
| 333. Manpower Planning and Management | |

Courses for the M.S. in Management Sciences

- | | |
|---|---|
| 300. Managerial Economics | 341. Marketing Management |
| 302. Planning and Internal Organization | 342. Financial Management |
| 310. Mathematics for Management | 343. Production Management |
| 311. Probability and Statistics | 344. Human Resource Management |
| 312. Operations Research | 350. Social Issues and the Complex Organization |
| 320. Organization Analysis and Operation Design | 390. Practicum |
| 330. Accounting and Control Systems | |

Chemistry

In the Department of Chemistry graduate work is offered leading to the A.M. and Ph.D. degrees. Before undertaking a graduate program in chemistry, a student should have taken an undergraduate major in chemistry along with related work in mathematics and physics.

Graduate courses in the department are offered in the fields of analytical, inorganic, organic, and physical chemistry. Research programs are active in all these fields. A booklet providing detailed information on the department is available from the Director of Graduate Studies.

Professors

Charles Kilgo Bradsher, Ph.D. (Harvard), *James B. Duke Professor*; Frances Campbell Brown, Ph.D. (Johns Hopkins); Donald B. Chesnut, Ph.D. (California Institute of Technology), *Director of Graduate Studies*; Marcus Edwin Hobbs, Ph.D. (Duke); Peter W. Jeffs, Ph.D. (Natal); William R. Krigbaum, Ph.D. (Illinois), *James B. Duke Professor*; William E. Parham, Ph.D. (Illinois), *R. J. Reynolds Company Professor of Chemistry*; Jacques C. Poirer, Ph.D. (Chicago); Louis DeBose Quin, Ph.D. (North Carolina), *Chairman*; Peter Smith, Ph.D. (Cambridge); Howard Austin Strobel, Ph.D. (Brown); Pelham Wilder, Jr., Ph.D. (Harvard).

Associate Professors

Andrew T. McPhail, Ph.D. (Glasgow); Richard A. Palmer, Ph.D. (Illinois); Richard L. Wells, Ph.D. (Indiana).

Assistant Professors

Steven Baldwin, Ph.D. (California); Alvin L. Crumbliss, Ph.D. (Northwestern); William Gutknecht, Ph.D. (Purdue); Robert W. Henkens, Ph.D. (Yale); Charles H. Lochmüller, Ph.D. (Fordham); Ned Allen Porter, Ph.D. (Harvard).

Adjunct Professor

Anton Peterlin, Ph.D. (University of Berlin).

Adjunct Associate Professors

Colin G. Pitt, Ph.D. (London); David Rosenthal, Ph.D. (MIT).

Courses of Instruction

- | | |
|---|--|
| 216. Nuclear Chemistry | 331, 332. Seminar in Analytical Chemistry |
| 217. Inorganic Chemistry | 333. Separation Methods |
| 234. Chemical Instrumentation | 338. Advanced Analytical Chemistry |
| 240. Chemical Oceanography | 350. Organic Reactions |
| 252. Advanced Organic Preparations | 353. Special Topics in Organic Chemistry |
| 253, 254. Structural and Physical Organic Chemistry | 354. Advanced Physical Chemistry |
| 255. Structural Analysis by Spectroscopic Methods | 355. Special Topics in the Chemistry of Natural Products |
| 256. Synthetic Methods and Organic Reactions | 356. Heterocyclic Chemistry |
| 261. Spectroscopy and Molecular Structure | 360. Polymer Chemistry |
| 263. Thermodynamics | 362. Kinetics of Chemical Reactions |
| 264. Biophysical Chemistry | 364. Special Topics in Physical Chemistry |
| 267. Introductory Quantum Mechanics | 365. Introductory Statistical Mechanics |
| 271. Introduction to Research | 366. Statistical Mechanics |
| 315. Topics in Transition Metal Chemistry | 368. Quantum Mechanics |
| 316. Topics in Non-Metal Chemistry | 373, 374. Seminar |
| 317, 318. Seminar in Inorganic Chemistry | 375, 376. Research |
| | 377. Research Orientation Seminar |
| | 381. Laboratory in Organic Chemistry |
| | 382. Laboratory in Analytical Chemistry |

Classical Studies

The Department of Classical Studies offers two programs leading to the Ph.D. degree, one with emphasis on literature and philology, the other with emphasis on ancient history and archaeology. For regular admission to the program in literature and philology a student must offer three years of college study above the elementary level in one of the classical languages and two college years in the other. Students wishing to enter the program in ancient history and archaeology will be required on entrance to demonstrate satisfactory competence in both Greek and Latin for reading in the primary sources; failure to demonstrate such competence will require modification of the student's program to repair the deficiency.

The department's special requirements in addition to the general requirements of the University for the Ph.D. degree set forth in the section on Program Information of detailed official *Bulletin of the Graduate School* are presented in a sheet that may be obtained from the Director of Graduate Studies. They include special requirements on seminars, course work, and the preliminary examinations for the Ph.D. degree.

Professors

Francis Newton, Ph.D. (North Carolina), *Chairman*; John F. Oates, Ph.D. (Yale), *Director of Graduate Studies*; Lawrence Richardson, Jr., Ph.D. (Yale), F.A.A.R.; James N. Truesdale, Ph.D. (Duke); William H. Willis, Ph.D. (Yale).

Associate Professor

Dennis Keith Stanley, Ph.D. (Johns Hopkins).

Assistant Professors

Peter H. Burian, Ph.D. (Princeton); Charles Edwin V. Nixon, Ph.D. (Michigan); Kent J. Rigsby, M.A. (Harvard).

GREEK

Courses of Instruction

- | | |
|--------------------------|------------------------------------|
| 200. Graduate Reading | *241. Advanced Prose Composition |
| *203. Homer | 301. Greek Seminar I |
| *205. Greek Lyric Poets | 302. Greek Seminar II |
| *206. Aeschylus | 303. Greek Seminar III |
| *208. Sophocles | 304. Greek Seminar IV |
| *209. Euripides | 305. Greek Seminar V |
| *210. Aristophanes | 306. Greek Seminar VI |
| 221. Early Greek Prose | 311. Proseminar in Papyrology |
| *222. Thucydides | 313. Proseminar in Greek Epigraphy |
| *223. Greek Orators I | 321. Seminar in Literary Papyri |
| *224. Greek Orators II | 323. Seminar in Documentary Papyri |
| *225. Plato | 399. Directed Reading and Research |
| *231. Hellenistic Poetry | |

*Not offered in 1972-73.

LATIN

- | | |
|-----------------------------------|---------------------------------------|
| 200. Graduate Reading | *222. Mediaeval Latin II |
| *201. The Verse Treatise | *241. Advanced Latin Composition |
| *202. Roman Satire | 301. Latin Seminar I |
| *203. Epic: Vergil | 302. Latin Seminar II |
| *204. Epic: Lucan and Statius | 303. Latin Seminar III |
| *207. The Prose Epistle | 304. Latin Seminar IV |
| 208. The Epistle in Verse | 305. Latin Seminar V |
| *209. Fragments of Early Latin | 306. Latin Seminar VI |
| *210. Lyric and Occasional Poetry | 312. Proseminar in Latin Palaeography |
| *211. Roman Oratory I | 314. Proseminar in Latin Epigraphy |
| *212. Roman Oratory II | 315. Proseminar in Roman Law |
| *221. Mediaeval Latin I | 399. Directed Reading and Research |

*Not offered in 1972-73.

CLASSICAL STUDIES

301. Introduction to Classical Philology

CLASSICAL STUDIES (ANCIENT HISTORY)

- | | |
|---|--|
| *253. Greece to the Orientalizing Period | 263. From the Flavian Dynasty to the Severan |
| *254. The Age of the Tyrants and the Persian Wars | 264. From Septimius Severus to Constantine |
| *255. The Age of Pericles | *270. The Rise of the Hellenistic Kingdoms |
| *256. The Fourth Century through Alexander | *271. The Hellenistic Kingdoms, 250-31 B.C. |
| *257. Social and Cultural History of the Hellenistic World from Alexander to Augustus | 321. Seminar in Ancient History I |
| *258. Social and Cultural History of the Graeco-Roman World | 322. Seminar in Ancient History II |
| *260. The History of Rome to 146 B.C. | 323. Seminar in Ancient History III |
| *261. The Roman Revolution, 146-30 B.C. | 324. Seminar in Ancient History IV |
| 262. Rome under the Julio-Claudians | 325. Seminar in Ancient History V |
| | 326. Seminar in Ancient History VI |

*Not offered in 1972-73.

CLASSICAL STUDIES (ARCHAEOLOGY)

- | | |
|-----------------------|---------------------|
| *231. Greek Sculpture | 232. Greek Painting |
|-----------------------|---------------------|

*Not offered in 1972-73.

- *235. Roman Architecture
- *236. Roman Painting
- *Not offered in 1972-73.

- 311. Archaeology Seminar I
- 312. Archaeology Seminar II

Comparative Literature

No graduate degree is offered in comparative literature. The following courses may serve in the minor programs of students in other departments. Consult Professor Salinger, Department of Germanic Languages and Literature.

Courses of Instruction

- | | |
|---|--|
| 201, 202. Romanticism | 301. The Hero in European Fiction, 1830-1940 |
| 203, 204. Realism and Symbolism | |
| 205. Foundations of Twentieth-Century European Literature | |

Computer Science Program

The Computer Science Program offers basic graduate courses leading to the A.M. degree. Research and course work in the field of computer science may be elected as a specialization by candidates for the Ph.D. who are under the direction of the Departments of Electrical Engineering, Economics, Mathematics, and others. A student entering graduate work in computer science should have a knowledge of mathematics through advanced calculus and differential equations and of at least two computer programming languages. The research areas currently active within the program include compiler design, real-time computing, information storage and retrieval, computer design, simulation of systems of interest to social scientists, and numerical analysis.

Professors

Thomas M. Gallie, Ph.D. (Rice), *Director*; Thomas H. Naylor, Ph.D. (Tulane); Max A. Woodbury, Ph.D. (Michigan).

Associate Professors

Merrell L. Patrick, Ph.D. (Carnegie), *Director of Graduate Studies*; Charles Starmer, Ph.D. (North Carolina).

Assistant Professors

William E. Hammond, Ph.D. (Duke); Dietolf Ramm, Ph.D. (Duke).

Adjunct Associate Professor

Leland Williams, Ph.D. (Duke).

Courses of Instruction

- | | |
|--|---|
| 203. Random Signals and Noise | 244. Econometrics II |
| 205. Signal Detection and Extraction Theory | 250. Clustering and Classification |
| 208. Digital Computer Design | 265. Advanced Topics in Computer Science |
| 211, 212. Real-Time Data Acquisition Systems | 306. Adaptive Detection and Communication Systems |
| 221, 222. Numerical Analysis | 307. Advanced Digital Systems I |
| 231. Operating Systems | 308. Advanced Digital Systems II |
| 232. Metaprograms | 311. Inverse Biomedical Models |
| 241, 242. Information Organization and Retrieval | |

Economics

The Department of Economics offers graduate work leading to the A.M. and Ph.D. degrees. A student entering graduate work in economics should have completed with satisfactory grades at least 12 semester hours of undergraduate work in economics, including 6 hours of principles of economics. Among the undergraduate courses of

distinct advantage to the graduate student in economics are general accounting, elementary statistics, intermediate economic theory, money and banking, international trade, and basic courses in philosophy, mathematics, and social sciences other than economics.

Requirements for the Ph.D. in economics include a core of courses or equivalent preparation in mathematical economics, statistical methods, micro and macroeconomic theory, and the history of economic thought. Economic growth and demography, money and banking, international trade, labor economics, economic history, public finance, industrial organization, statistics, and econometrics are optional fields, of which the student elects at least two in preparation for the preliminary doctoral examination. Course requirements for the Ph.D., including a minor field, should be completed in four semesters of residence.

Professors

John Oliver Blackburn, Ph.D. (Florida); Martin Bronfenbrenner, Ph.D. (Chicago); David George Davies, Ph.D. (California at Los Angeles), *Chairman*; Frank Traver de Vyver, Ph.D. (Princeton); Craufurd David Goodwin, Ph.D. (Duke); Frank Allan Hanna, Ph.D. (Wisconsin); Juanita Morris Kreps, Ph.D. (Duke); Thomas Herbert Naylor, Ph.D. (Tulane); Lloyd Blackstone Saville, Ph.D. (Columbia); Joseph John Spengler, Ph.D. (Ohio State), L.H.D., *James B. Duke Professor of Economics*; William Poe Yohe, Ph.D. (Michigan), *Director of Graduate Studies*.

Associate Professors

Thomas M. Havrilesky, Ph.D. (Illinois); Vladimir G. Treml, Ph.D. (North Carolina); John M. Vernon, Ph.D. (MIT).

Assistant Professors

David E. Black, Ph.D. (MIT); Peter B. Clark, Ph.D. (MIT); Daniel A. Graham, Ph.D. (Duke); Marjorie McElroy, Ph.D. (Northwestern); Jay S. Salkin, Ph.D. (Northwestern); Eliot Roy Weintraub, Ph.D. (Pennsylvania).

Courses of Instruction

- | | |
|---|--|
| 204. Advanced Money and Banking | 320. Macroeconomic Analysis I |
| 231. Economic Development of Europe | 321. Theory of Quantitative Economic Policy |
| *233. State and Local Finance | 322. Macroeconomic Analysis II |
| 237, 238. Statistical Methods | 323. Income Distribution Theory |
| 243. Econometrics I | 329. Federal Finance |
| 244. Econometrics II | 330. Seminar in Public Finance |
| 262. Trade Unionism and Collective Bargaining | 331. Seminar in Economic History |
| 265. International Trade and Finance | *340. National Income |
| 268. Competition and Monopoly | 344. Workshop on Computer Models of Social Systems |
| 287. Public Finance | 345, 346. Demographic Techniques I and II |
| 293. Soviet Economic History | 350. Seminar in Applied Economics |
| 294. Soviet Economic System | 355. Seminar in Labor Economics |
| 301. Microeconomic Analysis I | 358. Seminar in Labor Market and Related Analysis |
| 302. Microeconomic Analysis II | 365. Seminar in International Economics |
| 303. Theory of Economic Decision-Making | 366. Monetary Aspects of International Trade and Finance |
| 304, 305. Seminar in Money and Banking | *388. Industrial Organization |
| 307. Quantitative Analysis I | *389. Seminar in Industrial and Governmental Problems |
| 308. Quantitative Analysis II | 397, 398. Directed Research |
| 311, 312. History of Political Economy | 401. Seminar on the British Commonwealth |
| 313, 314. Seminar in Economic Theory | 402. Interdisciplinary Seminar in the History of the Social Sciences |
| 316. Seminar in Economics of Soviet-Type Socialism | |
| 317. Seminar in Demographic, Population, and Resource Problems | |
| 318. Dissertation Seminar | |
| 319. Seminar in the Theory and the Problems of Economic Growth and Change | |

*Offered on demand.



Education

Graduate work in education is offered leading to the A.M., M.Ed., M.A.T., Ed.D., and Ph.D. degrees. For each of these degrees there are specific requirements and prerequisites, all of which may be found stated in detail in the official detailed *Bulletin of the Graduate School*. Departmental requirements and prerequisites for all of these degrees may be obtained from the Director of Graduate Studies.

From the courses listed below, plus several in related disciplines, a selection may be made which will meet North Carolina requirements for the advanced Principal's Certificate and the Superintendent's Certificate. (Some courses below are offered only in the summer session; see the *Bulletin of the Summer Session*.)

These programs are accredited by the National Council for Accreditation of Teacher Education for the preparation of elementary and secondary school teachers and school service personnel, with the doctor's degree as the highest degree approved.

Professors

Francis E. Bowman, Ph.D. (Harvard); William H. Cartwright, Ph.D. (Minnesota); W. Scott Gehman, Jr., Ph.D. (Pennsylvania); Sherwood Githens, Jr., Ph.D. (North Carolina); Everett H. Hopkins, M.A., LL.D. (Wittenburg); Allan S. Hurlburt, Ph.D. (Cornell), *Chairman*; Olan Lee Petty, Ph.D. (Iowa); R. Baird Shuman, Ph.D. (Pennsylvania); Henry Weitz, Ed.D. (Rutgers).

Associate Professors

Anne H. Adams, Ed.D. (Mississippi); Robert H. Ballantyne, Ed.D. (Washington State); Peter F. Carbone, Ed.D. (Harvard); *Director of Cooperative Program*; Robert Merle Colver, Ed.D. (Kansas); Joseph DiBona, Ph.D. (California); Charles B. Johnson, Ed.D. (Duke), *Director of Graduate Studies*; William G. Katzenmeyer, Ed.D. (Duke); David V. Martin, Ed.D. (Duke); Robert A. Pittillo, Jr., Ed.D. (Duke); Henry L. Sublett, Ed.D. (Virginia).

Assistant Professor

Lucy T. Davis, Ed.D. (Columbia).

Visiting Associate Professor

Marilyn T. Erickson, Ph.D. (Washington).

Adjunct Professor

J. A. Davis, Ph.D. (Columbia).

Courses of Instruction

201. Teaching and Supervision of Arithmetic

202. Comparative and International Education: Industrialized Nations

204. Educational Organization

206. Studies in the History of Educational Philosophy

207. Social History of Twentieth-Century American Education

211. The Problem Child

*213. Elementary-School Organization and Administration

215. Secondary Education: Principles

216. Secondary Education: Internship

217. The Psychological Principles of Education

218. Comparative and International Education

219. Comparative and International Education: South Asia

221. Programs in Early Childhood Education

222. New Developments in Elementary School Curriculum

*223. Teaching the Language Arts

225. The Teaching of History and the Social Sciences

226. Teaching Reading in the Elementary School

227. The Teaching of Geography

229. Formal and Informal Classroom Diagnosis of Reading Disability Cases

233. Improvement of Instruction in English

234. Secondary-School Organization and Administration

236. Teaching Reading in the Secondary Schools

237. The Teaching of Literature in Secondary Schools

238. Content, Supervision, and Administration of Reading Programs

239. The Teaching of Grammar, Composition, Mechanics, and Usage in Secondary Schools

240. Career Development

241. Principles of Guidance and Student Personnel Work

243. Personality Dynamics

244. Counseling Techniques

245. Theories of Counseling

246. The Teaching of Mathematics

247, 248. Practicum in Counseling

249. Exceptional Children
- 250, 251. Teaching Emotionally Disturbed Children: Internship

*252. The School in the Legal Structure

253. Law and Education

255. Assessment of Abilities

256. Classroom Assessment of Student Achievement

258. Assessment of Personality, Interests, and Attitudes

260. Introduction to Educational Research

261. Intermediate Educational Research

*266. Science in the Elementary School

270. The Junior College

276. The Teaching of High-School Science

291. Public and Community Relations of Schools

300. Individual Assessment of Intelligence

306. Seminar in Philosophical Analysis of Educational Concepts

311. Group Counseling

313. Seminar in Education and Public Policy

315. Seminar in Secondary-School Teaching

321. Educational Management

322. Planning and Management of Educational Facilities

*323. Public School Finance

332. Supervision of Instruction

333. Seminar in Higher Education

335, 336. Seminar in School Administration

337. Seminar in Community College Organization

341. Seminar in Elementary-School Curriculum

342. Seminar in Secondary-School Curriculum

343. History of Higher Education in America

344. Research in Higher Education

345. Seminar in Reading Instruction and Research

348, 349. Seminar in Child Psychopathology

350, 351. Directed Activities in Education

354. Seminar in Law and Educational Organization

360. Seminar on Instructional Strategies

*Offered on demand.

Engineering

George Wilbur Pearsall, Sc.D., *Dean*.

The School of Engineering offers programs of study and research leading to the degrees of Master of Science and Doctor of Philosophy with a major in biomedical, civil, electrical, or mechanical engineering. These programs are designed to provide

a fundamental understanding of the science of engineering, which is based on mathematics and the physical sciences, and to develop experience in the art of engineering, which depends on human imagination and judgment. Each engineering graduate student may participate in seminars appropriate to his field of study.

A minimum of 30 units of earned graduate credit beyond the bachelor's degree is required for the M.S. degree: 12 in the major, 6 in related minor work (normally mathematics or natural science), 6 in either the major or minor subject or in other areas approved by the major department and the Dean of the School of Engineering, and 6 for a research-based thesis. A non-thesis option requiring 30 units of course credit is available. Each of the departments imposes additional requirements in the exercise of this option. There is no language requirement for this degree.

A minimum of 60 units of earned graduate credit beyond the bachelor's degree is required for the Ph.D. degree: 24 in the major, 12 in related minor work (normally mathematics or natural science), 12 in either the major or minor subject or other areas approved by the major department and the Dean of the School of Engineering, and 12 for a research-based dissertation. In addition, a reading knowledge of one foreign language which is relevant to the field of the dissertation is required (normally French, German, or Russian) in civil and mechanical engineering. The language requirement may be waived under certain circumstances. The directors of graduate studies will, during the first period of full-time registration of each doctoral aspirant, appoint a program advisory committee consisting of three members of the graduate faculty in areas relevant to the student's intended major. The preliminary examination may be either written, oral, or a combination of written and oral components, at the discretion of the committee and the department.

BIOMEDICAL ENGINEERING

The Graduate School offers an interdisciplinary program in biomedical engineering leading to the M.S. and Ph.D. degrees. The purpose of this program is to encourage the optimum combination of engineering and biomedical course work with an interdisciplinary research topic so that the graduates of this program can contribute at the most advanced professional level to the interdisciplinary field of biomedical engineering.

The major research areas available include: biomechanics, biomedical materials, biomedical modeling, data acquisition and processing, and neural networks. Information about graduate fellowships may be obtained from Dr. Theo C. Pilkington, Chairman, Department of Biomedical Engineering.

Professors

Theo Clyde Pilkington, Ph.D. (Duke), *Chairman*; Frederick L. Thurstone, Ph.D. (North Carolina State), *Director of Graduate Studies*.

Associate Professors

Howard Clark, Ph.D. (Maryland); Brian A. Hills, Ph.D. (Adelaide); Loren Nolte, Ph.D. (Michigan); Howard C. Wachtel, Ph.D. (New York Univ.).

Assistant Professors

Roger Barr, Ph.D. (Duke); William E. Hammond, Ph.D. (Duke).

Lecturer

Myron Wolbarsht, Ph.D. (Johns Hopkins).

Courses of Instruction

- | | |
|--|---|
| 201. Introductory Biomedical Engineering I | 323. Biomedical Materials and Artificial Organs |
| 202. Introductory Biomedical Engineering II | 333. Biomedical Imaging |
| 265. Advanced Topics in Biomedical Engineering | 399. Special Readings in Biomedical Engineering |
| 311. Inverse Biomedical Models | |

CIVIL ENGINEERING

A student may specialize in one of the following fields of study for either the M.S. or the Ph.D. degree with a major in civil engineering: engineering mechanics, structural engineering, soil mechanics and geotechnical engineering, fluid mechanics and ocean engineering, materials science and engineering, environmental engineering, urban systems and transportation engineering. Programs combining study in some of these areas with business administration, social sciences, and other areas of engineering are also available. Each graduate student participates in seminars appropriate to his field of study.

Under the Reciprocal Agreement with the Consolidated University of North Carolina, a student may include as a portion of the minimum requirements work offered by the Department of Environmental Science and Engineering of the University of North Carolina. Although minor work normally is taken in the natural sciences or mathematics, a student whose major interest relates to the social sciences may take relevant minor work in this area.

A minimum prerequisite to the graduate program in civil engineering is a basic knowledge of mathematics through linear differential equations, materials science, solid mechanics, and fluid mechanics.

Professors

Earl I. Brown, Ph.D. (Texas), *J. A. Jones Professor of Civil Engineering*; James Lathrop Meriam, Ph.D. (Yale); Aleksandar Sedmak Vesic, D.Sc. (Belgrade), *J. A. Jones Professor of Civil Engineering and Chairman*.

Associate Professors

J. Dvorak, Ph.D. (Brown); Bruce J. Muga, Ph.D. (Illinois), *Director of Graduate Studies*; Aubrey E. Palmer, C.E. (Virginia); Senol Utku, Sc.D. (MIT); James F. Wilson, Ph.D. (Ohio State).

Assistant Professors

G. Wayne Clough, Ph.D. (California at Berkeley); Jarir Dajani, Ph.D. (Northwestern); P. Arne Vesilind, Ph.D. (North Carolina).

Courses of Instruction

- | | |
|---|--|
| 201. Advanced Mechanics of Solids | 247. Air Pollution Control |
| 202. Experimental Mechanics | 248. Solid Waste Management |
| 203. Elastic Stability | 250. Engineering Analysis |
| 204. Plates and Shells | *304. Advanced Plates and Shells |
| *205. Elasticity | 305. Advanced Elasticity |
| 211. Mechanical Behavior of Materials | 306. Plasticity |
| 217. Urban Systems Analysis | *307. Viscoelasticity |
| 221. Incompressible Fluid Flow | 309. Advanced Structural Dynamics |
| 222. Open-Channel Flow | 321. Mechanics of Ideal Fluids |
| *223. Flow Through Porous Media | 331. Advanced Structural Analysis I |
| *224. Coastal and Tidal Hydraulics | 332. Advanced Structural Analysis II |
| *225. Engineering Hydrology | *335. Mechanical Behavior of Soils |
| *230. Matrix Methods for Structural Analysis | 336. Advanced Soil Mechanics |
| 231. Structural Engineering Analysis | 337. Elements of Soil Dynamics |
| *232. Reinforced Concrete Design | *338. Rock Mechanics |
| 233. Prestressed Concrete Design | 350. Advanced Engineering Analysis |
| 234. Structural Design in Metals | 365. Advanced Topics in Civil Engineering |
| *235. Foundation Engineering | 399. Special Readings in Civil Engineering |
| 236. Earth Structures | |
| 243, 244. Sanitary Engineering Unit Operations and Process Design | |

*Not offered in 1972-73.

ELECTRICAL ENGINEERING

A student may specialize in any one of the following fields in working toward either the M.S. or the Ph.D. degree: solid-state materials and devices, ferromag-

netics, super-conducting circuits, instrumentation, electronics, microwaves and automatic control, energy conversion, digital systems, stochastic systems, information processing, and biomedical engineering.

A minimum prerequisite to the graduate courses in electrical engineering is a basic knowledge of differential equations, electric and magnetic field theory, and the theory of networks. A previous course in modern physics is recommended. There is no foreign language requirement. A qualifying examination is required for the Ph.D. program.

Professors

John Leslie Artley, D.Eng. (Johns Hopkins), *Director of Graduate Studies*; Robert Blackburn Kerr, D.Eng. (Johns Hopkins); Otto Meier, Jr., Ph.D. (Pennsylvania); Harry Ashton Owen, Jr., Ph.D. (North Carolina State), *Chairman*; Theo Clyde Pilkington, Ph.D. (Duke); Frederick L. Thurstone, Ph.D. (North Carolina State); Thomas George Wilson, Sc.D. (Harvard).

Associate Professors

Herbert Hacker, Ph.D. (Michigan); William Thomas Joines, Ph.D. (Duke); Peter N. Marinos, Ph.D. (North Carolina State); Loren William Nolte, Ph.D. (Michigan); Paul P. Wang, Ph.D. (Ohio State); Bruce Arrington Wells, M.S.E.E. (Oregon State).

Assistant Professor

Rhett Truesdale George, Ph.D. (Florida).

Visiting Professor

Philip Harold Trickey, M.S.E.E. (Maine).

Adjunct Associate Professor

Robert Mercer Burger, Ph.D. (Brown).

Courses of Instruction

- | | |
|---|---|
| 203. Random Signals and Noise | 297-298. Thesis Research |
| 204. Information Theory and Communication Systems | 304. Estimation, Filtering, and System Identification |
| 205. Signal Detection and Extraction Theory | 305. Advanced Applications of Statistical Decision Theory |
| 208. Digital Computer Design | 306. Adaptive Detection and Communication Systems |
| 211. Solid State Theory | 307. Advanced Digital Systems I |
| 212. Solid State Materials | 308. Advanced Digital Systems II |
| 213. Principles of Magnetism | 311. Quantum Theory of Materials |
| 215. Semiconductor Physics | 313. Magnetic Processes in Materials |
| 217. Masers | 315. Semiconductor Devices |
| 222. Nonlinear Analysis | 321. Nonlinear Magnetic and Semiconductor Circuits |
| 225. Semiconductor Electric Circuits | 324. Nonlinear Oscillations in Physical Systems |
| 227. Network Synthesis | 342. Optimal Control Theory |
| 242. Modern Control and Dynamic Systems | 345. Stochastic Control Systems |
| 243. Advanced Linear Systems Theory | 361, 362. Electrical Engineering Seminar-Journal |
| *259. Advanced Electric Energy Conversion | 371. Advanced Electromagnetic Theory |
| 265. Advanced Topics in Electrical Engineering | 373. Selected Topics in Field Theory |
| 271. Electromagnetic Theory | 399. Special Readings in Electrical Engineering |
| 272. Applications of Electromagnetic Theory | |

*Offered on demand.

MECHANICAL ENGINEERING

Graduate study is available to students seeking the M.S. and Ph.D. degrees with a major in mechanical engineering. Departmental programs of advanced study and research include control systems, dynamics and vibrations, fluid mechanics, heat and mass transport, mechanical design, metallurgy, polymer science, and thermodynamics. The mechanical engineering faculty cooperates with faculty members from a

number of other departments and schools to establish interdisciplinary research projects and programs of study in the areas which include applied mechanics, biomechanics, biomedical materials, energy conversion, environmental quality and control, interaction of fields and materials, ocean engineering, systems engineering, and transportation systems.

Professors

Jack Bartley Chaddock, Sc.D. (MIT), *Chairman*; Charles Morgan Harman, Ph.D. (Wisconsin); Van Leslie Kenyon, Jr., M.M.E. (Delware); L. Sigfred Linderroth, M.E. (Iowa State); John Nelson Macduff, M.M.E. (New York Univ.); James Lathrop Meriam, Ph.D. (Yale); George Wilbur Pearsall, Sc.D. (MIT).

Associate Professors

Howard G. Clark, Ph.D. (Maryland); Ernest Elsevier, M.S.M.E. (Georgia Institute of Technology); Marion LaVerne Shepard, Ph.D. (Iowa State).

Assistant Professors

Gale Herbert Buzzard, Ph.D. (North Carolina State), *Director of Graduate Studies*; Bruce R. Munson, Ph.D. (Minnesota); Donald Wright, Ph.D. (Purdue).

Adjunct Professor

James Joseph Murray, S.M. Physics (Chicago).

Courses of Instruction

- | | |
|---|--|
| 202. Theoretical Thermodynamics | 270. Theory of Lubrication and Bearing Design |
| 203. Introduction to Advanced Mechanics | 280. Nuclear Reactor Power Cycles |
| 211. Theoretical and Applied Polymer Science | 297-298. Thesis Research |
| 214. Environmental Factors in Materials Science | 300. Advanced Projects in Mechanical Engineering |
| 221. Compressible Fluid Flow | 302. Advanced Thermodynamics |
| 222. Heat Transfer | 311. Behavior of Crystalline Solids |
| 226. Intermediate Fluid Mechanics | 322. Mechanics of Viscous Fluids |
| 230. Modern Control and Dynamic Systems | 323. Convective Heat Transfer |
| 231. Systems Response and Control | 324. Conduction and Radiation Heat Transfer |
| 232. Nonlinear Analysis | 326. Hydrodynamic Stability |
| 233. Fluid Control Systems | 331. Nonlinear Control Systems |
| 235. Advanced Mechanical Vibrations | 335. Analytic Methods in Vibrations |
| 251. Refrigeration and Cryogenics | 372. Finite Element Techniques in Design |
| 255. Energy Conversion | 399. Special Readings in Mechanical Engineering |
| 265. Advanced Topics in Mechanical Engineering | |

English

The department offers graduate work leading to the A.M., M.A.T., and Ph.D. degrees. A statement of the requirements for the Ph.D. degree may be obtained from the Director of Graduate Studies. The department requires a reading knowledge of one modern foreign language for the A.M. degree and two languages, determined by the student's committee, for the Ph.D. degree.

Professors

Carl Anderson, Ph.D. (Pennsylvania); Louis J. Budd, Ph.D. (Wisconsin); Bernard I. Duffy, Ph.D. (Ohio State); Oliver W. Ferguson, Ph.D. (Illinois), *Chairman*; John L. Lievsay, Ph.D. (Washington), *Director of Graduate Studies*; Holger O. V. Nygard, Ph.D. (California); Lewis Patton, Ph.D. (Yale); Dale Randall, Ph.D. (Pennsylvania); Edmund Reiss, Ph.D. (Harvard); Charles Richard Sanders, Ph.D. (Chicago); Grover C. Smith, Ph.D. (Columbia); Lionel Stevenson, B.Litt. (Oxon), Ph.D. (California), F.R.S.L., *James B. Duke Professor of English*; Arlin Turner, Ph.D. (Texas); George W. Williams, Ph.D. (Virginia).

Associate Professors

John Clubbe, Ph.D. (Columbia); Wallace Jackson, Ph.D. (Pennsylvania); Buford Jones, Ph.D. (Harvard); Robert Krueger, D.Phil. (Oxon); Elgin Mellow, Ph.D. (London); Gerald Monsman, Ph.D. (Johns Hopkins); Victor H. Strandberg, Ph.D. (Brown).

Courses of Instruction

- 207, 208. History of the English Language
209. Present-Day English
210. Old English Literary Tradition
212. Middle English Literary Tradition
- 215, 216. Chaucer
221. English Prose of the Sixteenth Century
222. English Non-Dramatic Poetry of the Sixteenth Century
223. Spenser
224. Shakespeare
- 225, 226. Tudor and Stuart Drama, 1500-1642
- 229, 230. English Literature of the Seventeenth Century
232. Milton
234. English Drama, 1642-1800
- 235, 236. The Eighteenth Century
- 241, 242. English Literature of the Early Nineteenth Century
- 245, 246. English Literature of the Later Nineteenth Century
- 251, 252. English Literature of the Twentieth Century
- 263, 264. American Literature, 1800-1865
- 267, 268. American Literature, 1865-1910
- 270, 271. Southern Literature
- 275, 276. American Literature Since 1910
277. Major Developments in Contemporary American Poetry
280. Introduction to Folklore
285. Literary Criticism
287. Recent Critical Thought
289. Literary Biography
- 298-299. A.M. Independent Reading
310. Beowulf
312. Studies in Middle English Literature
315. Studies in Chaucer
318. Medieval Romances
320. Studies in Renaissance English Prose
324. Studies in Shakespeare
329. Studies in the Metaphysical Poets
330. Studies in Dryden and His Age
331. Emerson
337. Studies in Swift
338. Samuel Johnson's Literary Criticism and Related Topics
339. The Eighteenth-Century Novel
341. Studies in English Romanticism
343. Studies in the Critical and Philosophical Ideas of Coleridge and Carlyle
347. Studies in Victorian Poetry
348. Studies in Victorian Fiction
349. Studies in Nineteenth-Century Nonfictional Prose
353. Studies in British Poetry of the Twentieth Century
360. Bibliography and Methods of Research in American Literature
364. Hawthorne and Melville
365. Emerson
366. Whitman
368. Studies in American Realistic Fiction
369. Studies in American Humor
376. Studies in Twentieth-Century American Literature
380. The Traditional Ballad and Folksong
382. Paleography
383. Textual Criticism
100. English for Foreign Students

Forestry

Major and minor work is offered in the natural and social scientific aspects of forestry and related areas of natural resources leading to the A.M., M.S., and Ph.D. degrees. Work for these degrees may be pursued in the biological science areas of dendrology and wood anatomy, forest ecology, tree physiology and biochemistry, forest pathology and forest entomology; in the environmental science areas of forest soils, meteorology, and hydrology; in resource economics and policy and in forest mensuration, biometry, and operations research. College graduates who have had specialized training in professional forestry or the related basic areas of the natural or social sciences may be considered for admission. Students will be restricted to the particular fields of specialization for which their academic background qualifies them. For information on professional training in forestry see *Bulletin of the School of Forestry*.

Professors

Roger Fabian Anderson, Ph.D. (Minnesota), *Director of Graduate Studies*; Robert Lloyd Barnes, Ph.D. (Duke); Ellwood Scott Harrar, Ph.D., Sc.D. (Syracuse), *James B. Duke Professor of Wood Science*; Henry Hellmers, Ph.D. (California at Berkeley); Paul Jackson Kramer, Ph.D. (Ohio State), *James B. Duke Professor of Botany*; Charles William Ralston, Ph.D. (Duke), *Dean of the School of Forestry*.

Associate Professors

Kenneth Richard Knoerr, Ph.D. (Yale); William James Stambaugh, Ph.D. (Yale); David O. Yandle, Ph.D. (North Carolina State).

Adjunct Associate Professors

Edgar W. Clark, Ph.D. (California at Berkeley); Charles S. Hodges, Jr., Ph.D. (Georgia); Louis John Metz, Ph.D. (Duke); Fred M. Vukovich, Ph.D. (St. Louis).

Assistant Professors

Roger C. Chapman, M.A. (California at Berkeley); Frank J. Convery, Ph.D. (State Univ. of New York); James E. Wuenschel, Ph.D. (Wisconsin).

BIOLOGICAL SCIENCE

Courses of Instruction

- | | |
|--|---|
| 201. Tree Physiology | 322. Microbiology of Forest Soils |
| 205. Tree Growth and Development | 331. Toxicology of Insecticides |
| 207. Chemistry of Woody Tissues | 332. Ecology of Forest Insects |
| 208. Physiology of Wood Formation | 335. Entomological Research Techniques |
| 222. Biology of Forest Insects and Diseases | 341. Ecological Principles in Environmental Management |
| 223. Forest Pathology | 345, 346. Natural Resource Ecology—Environmental Management Seminar |
| 230. Forest Entomology | 354. Quantitative Analysis of Ecological and Environmental Systems |
| 233. General Entomology | 385. Seminar in Forest Protection |
| 241. Dendrology | 398. Timbers of the World |
| 243. Natural Resource Ecology | |
| 290. Wood Anatomy | |
| 292. Microtechnique of Woody Tissue | |
| 305. Forest Tree Biochemistry | |
| 321. Phytopathological Technique in Forestry | |

ENVIRONMENTAL SCIENCE

- | | |
|---|---|
| 203. General Meteorology | 306. Dynamics of Local Atmospheric Motion |
| 204. Microclimatology | 342. Hydrologic Processes |
| 215. Air Pollution Meteorology | 344. Micrometeorology |
| 216. Watershed Hydrology | 362. Forest Soil Physics |
| 217. Environmental Instrumentation | 364. Soil Classification and Mapping |
| 261. Forest Soils | 366. Forest Soil Fertility |
| 304. Atmospheric Turbulence and Diffusion | |

RESOURCE ECONOMICS AND POLICY

- | | |
|--|----------------------------------|
| 269. Resource Economics and Policy | 378. Seminar in Forest Economics |
| 270. Economics of Forestry | |
| 377. Seminar in Natural Resource Allocation and Efficiency | |

STATISTICS AND OPERATIONS RESEARCH

- | | |
|---|--|
| 210. Analytical Techniques in Forest Utilization | 258. Operations Research |
| 250. Biometry | 352. Theory and Applications of Linear Statistical Models |
| 251. Theory and Methods for Sampling Biological Populations | 353. Design and Analysis of Experiments |
| 253. Computer Science in Natural Resources | 354. Quantitative Analysis of Ecological and Environmental Systems |

SPECIAL STUDIES AND RESEARCH

- | | |
|--|--------------------------------|
| 299. Special Studies in Forestry | 357, 358. Research in Forestry |
| 301, 302. Advanced Studies in Forestry | 368. Field Seminars |

The University Program in Genetics

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Graduate students registered in any of the biological sciences departments may apply to the faculty of the genetics program to pur-

sue study and research leading to an advanced degree. It would be helpful if applicants for admission to the Graduate School indicated their interest in the genetics program at the time of application. Requests for information describing more completely the research interests of the staff, facilities, and special stipends and fellowships should be addressed to the Director, Genetics Program (Nanaline H. Duke Building, Room 151).

Professors

D. Bernard Amos, M.D. (Guys Hospital, London); Samson R. Gross, Ph.D. (Columbia), *Director*; John Buettner-Janusch, Ph.D. (Michigan); Walter R. Guild, Ph.D. (Yale).

Associate Professors

Nicholas Gillham, Ph.D. (Harvard); Calvin L. Ward, Ph.D. (Texas); Robert E. Webster, Ph.D. (Duke).

Assistant Professors

Janis Antonovics, Ph.D. (Wales); John E. Boynton, Ph.D. (California at Davis); Dwight H. Hall, Ph.D. (Purdue); Philip D. Harriman, Ph.D. (California at Berkeley); William N. Kelley, M.D. (Emory); Nicholas Kredich, M.D. (Michigan); Ronald Luftig, Ph.D. (Chicago); Frances E. Ward, Ph.D. (Brown).

Courses of Instruction

- | | |
|--|---|
| 204. Introductory Genetics | 284. Current Topics in Genetic Mechanisms |
| 215. Bacteriophage: Structure and Function | 285. Population Genetics and Evolution |
| 216. Molecular Genetics | 288. The Cell in Development and Heredity |
| 236. Human Genetics | 336. Immunogenetics |
| 280. Principles of Genetics | 351-352. Genetics Seminar |
| 282. Experimental Genetics | |
| 283. Developmental and Cellular Genetics | |

Geology

The Department of Geology offers graduate work leading to the A.M. degree. An undergraduate degree in geology is not a prerequisite for graduate studies, but a student must have had or must take a summer field geology course (or equivalent experience), mineralogy, sedimentary rocks, stratigraphy, paleontology, and structural geology. In addition he must have had one year of college chemistry, one year of college physics, and mathematics through calculus.

Graduate courses in the Department of Geology are designed to provide specialized training in the fields of oceanography, sedimentology, stratigraphy, paleontology, and low-temperature mineralogy. A thesis, but no language, is required for the A.M. degree.

Professor

S. Duncan Heron, Jr., Ph.D. (North Carolina), *Chairman*.

Associate Professors

William J. Furbish, M.S. (Wisconsin); George W. Lynts, Ph.D. (Wisconsin); Ronald D. Perkins, Ph.D. (Indiana); Orrin H. Pilkey, Ph.D. (Florida State), *Director of Graduate Studies*.

Visiting Assistant Professor

Mark Mantuani, Ph.D. (Duke).

Adjunct Assistant Professor

Ian Macintyre, Ph.D. (McGill).

Courses of Instruction

- | | |
|--|--|
| 205. Geological Oceanography | 208. Shallow-Marine Geology |
| 206. Principles of Geological Oceanography | 211. Stratigraphic Principles and Applications |

- *212. Environmental Stratigraphy
- 213. Sedimentology
- 214. Sediments in Thin Section
- 222. Sedimentary Minerals
- 226. Sedimentary Geochemistry
- *229. Economic Geology
- 230. Principles of Structural Geology
- 241-242. Invertebrate Paleontology
- 243-244. Micropaleontology
- 247. Paleoecology

*Offered on demand.

- *300. Seminar in Oceanography
- 305. Seminar in Continental Drift and Global Tectonics
- *310. Seminar in Stratigraphy
- *312. Seminar in Sedimentology
- *320. Seminar in Mineralogy
- *330. Seminar in Geochemistry
- *340. Seminar in Paleontology
- *350. Seminar in Geomathematics
- *371, 372. Advanced Topics in Geology

Germanic Languages and Literature

The Department of Germanic Languages and Literature offers graduate work leading to the A.M. degree. Students who expect a major in German should have had sufficient undergraduate courses in Germanic languages to enable them to proceed to more advanced work.

Students who wish to take courses in German for a minor should normally have completed a third-year course (in exceptional cases, a second-year) of college German with acceptable grades.

Professors

Leland R. Phelps, Ph.D. (Ohio State), *Chairman and Director of Graduate Studies*; Herman Salinger, Ph.D. (Yale).

Assistant Professors

A. Tilo Alt, Ph.D. (Texas); Richey Novak, Ph.D. (Johns Hopkins); Henry R. Stern, Ph.D. (Northwestern).

Courses of Instruction

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|--|---|
| *201, 202. Goethe | *218. The Teaching of German |
| 203, 204. Eighteenth Century | *219. Applied Linguistics |
| *205, 206. Middle High German | *230. German Cultural History |
| *207, 208. German Romanticism | *232. Bibliography and Methods |
| 209, 210. Kleist, Grillparzer, and Hebbel | *233. Advanced Composition |
| 211, 212. Nineteenth-Century Literature | *301. Gothic |
| 213. Heinrich Heine | *316. The Austrian Novel from 1930 to the Present |
| 214. The Twentieth Century | 321, 322. Germanic Seminar |
| *215. Seventeenth-Century Literature | _____ Graduate Reading Course |
| 216. History of the German Language | |
| *217. Renaissance and Reformation Literature | |

*Offered on demand.

History

The Department of History offers graduate work leading to the A.M. and Ph.D. degrees. The candidate for the A.M. degree must have a reading knowledge of at least one ancient or modern language related to his program of study and have completed successfully either a research paper (approximately fifty to sixty documented pages) or two related, chapter-length papers (approximately twenty-five to thirty documented pages each), normally the product of a year's seminar or two semester-courses. The paper or papers must be approved by two readers—the supervising professor and a second professor from the graduate staff. Students anticipating a May degree must have their papers read and approved by April 15; those anticipating a September degree must have their papers read and approved by August 15.

A candidate for the degree of Doctor of Philosophy is required to prepare himself for examination in four fields. Three shall normally be history. The choice of fields

is determined in consultation with the student's supervisor and the Director of Graduate Studies. The department offers graduate instruction in the fields of Afro-American history, ancient history, medieval Europe, early modern Europe, recent Europe, American history, English Renaissance, Modern Britain, British Empire and the Commonwealth, pre-revolutionary Russia, revolutionary Russia, Latin America, South Asia in the modern period, traditional China, modern China, traditional Japan, modern Japan, military history, history of science, history of medicine, and historiography. The candidate for the Ph.D. degree must normally have a reading knowledge of two foreign languages, but in certain cases where the candidate's supervisor and the Director of Graduate Studies approve, and where the candidate's research for the dissertation would appreciably benefit, an alternative to the second language may be accepted. This alternative would normally take the form of successfully completed formal training in an auxiliary discipline (such as statistics or social science methodology) of from 3 to 6 units, or their equivalent, depending upon the student's program. It also must be in addition to any previous undergraduate work in the discipline. The requirement, whether satisfied by two languages or by one language and an alternative, must be met prior to the preliminary examination.

Students may receive credit for either semester of a hyphenated course without taking the other semester if they obtain written permission from the instructor and the Director of Graduate Studies.

Professors

John R. Alden, Ph.D. (Michigan); Joel Colton, Ph.D. (Columbia), *Chairman*; Robert F. Durden, Ph.D. (Princeton); Ainslie T. Embree, Ph.D. (Columbia); Arthur B. Ferguson, Ph.D. (Cornell); William B. Hamilton, Ph.D. (Duke); Irving B. Holley, Jr., Ph.D. (Yale); Frederic Hollyday, Ph.D. (Duke); John Tate Lanning, Ph.D. (California); John F. Oates, Ph.D. (Yale); Harold T. Parker, Ph.D. (Chicago); Richard A. Preston, Ph.D. (Yale); Theodore Ropp, Ph.D. (Harvard); Anne Firor Scott, Ph.D. (Radcliffe); William E. Scott, Ph.D. (Yale); Bernard S. Silberman, Ph.D. (Michigan); John J. TePaske, Ph.D. (Duke); Richard L. Watson, Ph.D. (Yale); Charles Young, Ph.D. (Cornell), *Director of Graduate Studies*.

Associate Professors

Frances Dorothy Acomb, Ph.D. (Chicago); Gert H. Brieger, M.D. (California at Los Angeles), Ph.D. (Johns Hopkins); John Cell, Ph.D. (Duke); Calvin D. Davis, Ph.D. (Indiana); Warren Lerner, Ph.D. (Columbia); Ronald Witt, Ph.D. (Harvard).

Assistant Professors

Raymond Gavins, Ph.D. (Virginia); Gerald Hartwig, Ph.D. (Indiana); Seymour Mauskopf, Ph.D. (Princeton); Martin Miller, Ph.D. (Chicago); Sydney Nathans, Ph.D. (Johns Hopkins).

Courses of Instruction

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|--|---|
| 201-202. History of Russia, 1801-1917 | 233, 234. The Institutional, Cultural, and Social History of Hispanic America |
| 207-208. American Urban History | 237, 238. Europe in the Middle Ages, 395-1500 |
| 209-210. Afro-American History, 1619 to the Present | 240. Aspects of Traditional and Modern African Culture |
| 211. The United States and Latin America: A History of Inter-American Problems | 241-242. Modernization and Revolution in China |
| 212. Recent Interpretations of United States History | 243-244. Afro-American History, 1619 to the Present |
| 215-216. The Diplomatic History of the United States | 247. History of Modern India and Pakistan, 1707-1857 |
| 219. Political Processes in Traditional and Modern Africa | 248. History of Modern India and Pakistan, 1857 to the Present |
| 221, 222. Problems in the History of Late Medieval and Early Modern Europe | 249-250. Social and Intellectual History of the United States |
| 223-224. The Old Regime and the French Revolution, 1661-1815 | 261-262. Problems in Soviet History |
| 229. Recent Interpretations of Modern European History | 263-264. American Colonial History and the Revolution, 1607-1789 |
| 230. The History of Spain | 265-266. Modern South America |
| 231-232. The Hispanic Colonies and Republics in America | |

- 267-268. From Medieval to Early Modern England
269. British History, 1688-1867
270. British History from Mid-Nineteenth Century
- 273, 274. Topics in the History of Science
- 275-276. Central Europe, 1849-1914
- 277-278. The Era of the Civil War and Its Aftermath, 1820-1900
- 281-282. Development of Modern Medicine
- 283-284. Political and Social Change in the United States, 1789-1860
- 287-288. History of Modern Japan
290. East African History
296. Canada from the French Settlement to the Present
297. The British Empire in the Nineteenth Century (from 1783)
298. The Commonwealth in the Twentieth Century
- 305-306. Seminar in British History
- 307-308. Seminar in United States History
- 309-310. Seminar in American Colonial and Revolutionary History
- 317-318. Seminar in the History of Western Europe
- 321-322. Seminar in the History of Spain, Hispanic America, and Inter-American Relations
- 337-338. Seminar in Medieval History
- 343-344. Seminar in the History of American Foreign Relations
- 347-348. Seminar in Modern India
- 353-354. Seminar on the Second British Empire and the Commonwealth of Nations
- 361-362. Seminar in the History of Russia
- 371-372. Research Seminars
401. Seminar on the British Commonwealth
- 351.1-352.1 Military History
- 351.2-352.2 Modern European Intellectual and Cultural History
- 351.10-352.10. Medieval History
- 351.15-352.15. The English Renaissance
- 351.25-352.25. Central Europe, 1849-1914
- 351.30-352.30. European Diplomatic History since 1870
- 351.31-352.31. Twentieth-Century Europe
- 351.40-352.40. City and Frontier in United States History
- 351.45-352.45. Reform and Politics in Nineteenth-Century America
- 351.46-352.46. Twentieth-Century United States to 1941
- 351.47-352.47. Diplomatic History of the United States
- 351.60-352.60. Soviet History
- 351.65-352.65. Modernization and Revolution in China
- 351.70-352.70. Modern South Asia
312. Seminar in the Teaching of History in College
314. Historical and Social Science Methodology
320. Historiography



Hospital Administration

Graduate study leading toward preparation for a career of administration in hospitals and other health agencies is offered through a 24-month program leading to the M.H.A. degree. The program is composed of 45 to 48 graduate units, of which 27 are in hospital administration and 18 to 21 are in designated courses in other departments. Included in the program is a 12-month administrative residency, a period of supervised administrative experience conducted under faculty supervision in hospitals and other health agencies located within commuting distance of the University campus. Admission to this program is limited to 20 students per year; selection is based on suitability for management of health agencies as well as on capability for graduate study. As there are requirements for participation in the program in hospital administration in addition to basic admission requirements of the Graduate School, interested individuals should obtain complete information on prerequisites and selection procedures from the Coordinator of Graduate Studies.

Professor

Charles H. Frenzel, A.B. (Duke), *Director*.

Associate Professor

Louis E. Swanson, A.B. (Hamline).

Assistant Professor

Donald S. Smith, II, M.H.A. (Minnesota), *Coordinator of Graduate Studies*.

Adjunct Professor

John T. Gentry, M.D., M.P.H. (Harvard).

Adjunct Assistant Professor

Arnold D. Kaluzny, Ph.D. (Michigan).

Instructor

Kenneth J. Schoonhoven, M.H.A. (Duke).

Courses of Instruction

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|---|--|
| 201. History and Development of Hospitals and Other Health Agencies | 215, 216. Administrative Residency (One Calendar Year) |
| 203-204. Principles of Organization and Management of Hospitals and Other Health Agencies | 221. Public Policy and Health |
| 207. Community Health Care | 222. The Economics of Health |
| 208. Planning and Utilization of Health Services | 253. Computer Science |
| 211-212. Seminars in Health Administration | 258. Operations Research |
| | 271. Financial Management |
| | 272. Business Policy |
| | 300. Special Project |

The University Program in Marine Sciences

Training in the marine sciences at Duke University includes marine biology, marine geology, and oceanography. The departments which are chiefly concerned are Botany, Chemistry, Geology, and Zoology.

A graduate student working in the marine sciences will take his degree under the auspices of one of the above departments and must, therefore, meet the requirements of that department. During the first part of his training he will usually take courses on the Durham campus during the academic year and enroll in more specialized courses in the marine sciences at the Duke University Marine Laboratory during the summer. After the completion of his course work and preliminary examination (for doctoral candidates) he may, with approval of his major professor, request space for thesis research at the Marine Laboratory.

Persons interested in graduate work in marine sciences should apply through one of the appropriate departments. Forms may be obtained from the Graduate School.

Applications for summer courses at the Laboratory should be addressed to the Director, Duke University Marine Laboratory, Beaufort, North Carolina 28516. The form may be obtained from the *Duke University Marine Laboratory Bulletin*. The application for enrollment in the Duke University summer session should be accompanied by transcripts of undergraduate and graduate work. Applications should be received before March 10.

The following courses are offered during the summer at Beaufort. See the *Duke University Marine Laboratory Bulletin* for the current schedule of courses.

Professors

Cazlyn Green Bookhout, Ph.D. (Duke); John Costlow, Ph.D. (Duke), *Director*; *Terry W. Johnson, Jr., Ph.D. (Michigan).

Associate Professors

Richard T. Barber, Ph.D. (Stanford); *Orrin Pilkey, Ph.D. (Florida State); *Richard B. Searles, Ph.D. (California at Berkeley).

Assistant Professors

Richard B. Forward, Ph.D. (California at Santa Barbara); *John Gutnecht, Ph.D. (North Carolina); J. Bolling Sullivan, Ph.D. (Texas); John Sutherland, Ph.D. (California at Berkeley).

*In residence at the Marine Laboratory during summer only.

Courses of Instruction

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| 203. Marine Ecology | 274. Marine Invertebrate Zoology |
| 205. Geological Oceanography | 276. Comparative and Evolutionary Biochemistry |
| S205. Introductory Marine Microbiology | 278. Invertebrate Embryology |
| 211. Marine Phycology | 212. Marine Membrane Physiology |
| 250. Physiological Ecology of Marine Animals | 214. Biological Oceanography |
| | 240. Chemical Oceanography |

Mathematics

Graduate work in the Department of Mathematics is offered leading to the A.M. and Ph.D. degrees. The student, in his undergraduate work, must have had courses in differential and integral calculus, and at least 6 semester hours of other courses in mathematics on the junior or senior level.

All degree candidates are required to pass a comprehensive examination in the areas of algebra, analysis, and topology. Students will normally take the comprehensive examination after completing their first year of graduate study and just prior to the start of their second year.

The A.M. degree with a major in mathematics is awarded primarily on the basis of scholarship. It requires 30 units of graded course work in addition to the comprehensive examination. A thesis may be substituted for 6 units of course work only in unusual circumstances.

The Ph.D. degree in mathematics is awarded upon the demonstration of ability and training in research. The original dissertation, therefore, is the most important of the formal requirements for the degree.

All students are expected to participate in a proseminar during their first year of graduate study. The purpose is to provide experience in organizing and presenting material to their peers.

Since a reading knowledge of French, German, and Russian is highly desirable for a student of mathematics, he should satisfy the language requirement in one of these languages as early as possible. The department urges students to attain a reading knowledge of at least two of these languages. Members of the faculty remain free to assign readings in them for course work or dissertation work.

Professors

Leonard Carlitz, Ph.D. (Pennsylvania); Francis George Dressel, Ph.D. (Duke); Francis Joseph

Murray, Ph.D. (Columbia); Joseph Robert Shoenfield, Ph.D. (Michigan), *Chairman*; Seth L. Warner, Ph.D. (Harvard); Morris Weisfeld, Ph.D. (Yale); Max Adkin Woodbury, Ph.D. (Michigan).

Associate Professors

Donald Stanley Burdick, Ph.D. (Princeton), *Director of Graduate Studies*; Richard Earl Hodel, Ph.D. (Duke); Joseph Weston Kitchen, Ph.D. (Harvard); David Alexander Smith, Ph.D. (Yale); Olaf Patrick Stackelberg, Ph.D. (Minnesota).

Assistant Professors

Charles Ward Henson III, Ph.D. (MIT); David Guy Herr, Ph.D. (North Carolina); David Paul Kraines, Ph.D. (California at Berkeley); Jack A. Lees, Ph.D. (Chicago); Barry MacKichan, Ph.D. (Stanford); Lawrence Carlton Moore, Jr., Ph.D. (California Institute of Technology); William Michael O'Fallon, Ph.D. (North Carolina); Richard Arthur Scoville, Ph.D. (Yale); William Edwin Wilkinson, Ph.D. (North Carolina); Kai-Tac Wong, Ph.D. (Princeton).

Adjunct Professor

Walter Edwin Sewell, Ph.D. (Harvard).

Courses of Instruction

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|--|---|
| 204. Geometry for Teachers | *287, 288. Foundations of Mathematics |
| 207, 208. Introduction to Algebraic Structures | 290. Stochastic Processes |
| 217, 218. Intermediate Analysis | *297, 298. Axiomatic Set Theory |
| 221, 222. Numerical Analysis | *303, 304. Advanced Theory of Numbers |
| *227, 228. Theory of Numbers | 325, 326. Analysis III, IV |
| *229, 230. Algebraic Numbers | *327, 328. Partial Differential Equations |
| *234. Sample Designs | *329, 330. Theory of Distributions |
| 235, 236. Algebra | *331, 332. Advanced Topics in Complex Variables |
| *244. Design of Experiments | *333, 334. Analytic Theory of Numbers |
| *245, 246. Combinatorial Analysis | *335, 336. Topics in Algebra |
| *247, 248. Arithmetic of Polynomials | *353, 354. Topics in Analysis |
| *262. Non-Parametric Statistics | 361, 362. Hilbert Space |
| 265, 266. Homological Algebra and its Applications | *371, 372. Dimension Theory |
| 271, 272. Introductory Topology | *377, 378. Topics in Topology |
| *273, 274. Algebraic Topology | *383, 384. Lie Groups and Algebras |
| *275, 276. Probability | *392. Nuclear Spaces |
| 283. Applied Mathematical Statistics | *393. Topological Groups |
| 284. Least-Squares Analysis of Linear Models | *394. Topological Rings |
| 285. Applied Mathematical Methods I | *395, 396. Topological Algebra |
| 286. Applied Mathematical Methods II | *397, 398. Seminar in Algebra and Number Theory |

*Offered on demand.

Philosophy

The Department of Philosophy offers graduate work leading to the A.M. and Ph.D. degrees. Tutorial work complements formal instruction. Students may specialize in any of the following fields: the history of philosophy, logic, philosophy of science, epistemology, metaphysics, philosophical analysis, ethics, aesthetics, political philosophy, and philosophy of law. Applicants for admission must offer scores of the Graduate Record Examination or the Miller Analogies Test.

Individual programs of study are developed for each student. The following requirements, however, are fundamental: (1) In February of their first year new graduate students are required to take two or three qualifying examinations, diagnostic in purpose. One examination is in the history of philosophy, ancient and modern; a second examines his ability to deal critically and systematically with some basic philosophical topic; a third examination in logic is required of anyone who has not taken Philosophy 241. (2) The preliminary examinations for the Ph.D. degree, which may be taken only after a student has met the language requirement for that degree, should be taken after the second year of study. In these examinations students are expected to combine historical knowledge with critical understanding.

Work in a minor field, not necessarily confined to any one department, must include 6 units for the A.M. or the Ph.D. and may include more as a student's program requires or permits.

A student who meets the general requirements of the Graduate School for the A.M. degree may earn this degree by passing an examination for a reading knowledge of a foreign language and the preliminary examinations for the Ph.D. degree, or by writing and successfully defending a master's thesis.

A reading knowledge of at least one foreign language, ancient or modern, is required for the Ph.D. degree. No student may take his preliminary examinations until he has demonstrated this ability. More than one language may be required where this is judged appropriate to the research demanded by the candidate's dissertation.

Professors

Glenn Robert Negley, Ph.D. (Chicago); William Bernard Peach, Ph.D. (Harvard); Paul Welsh, Ph.D. (Cornell), *Chairman*.

Associate Professors

Edward P. Mahoney, Ph.D. (Columbia), *Director of Graduate Studies*; George W. Roberts, Ph.D. (Cambridge); David H. Sanford, Ph.D. (Cornell).

Assistant Professors

Richard E. Aquila, Ph.D. (Northwestern); David Coder, Ph.D. (Cornell).

Courses of Instruction

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|---|---|
| 202. Aesthetics: The Philosophy of Art | 232. Recent Continental Philosophy |
| 203. Contemporary Ethical Theories | 233. Methodology of the Empirical Sciences |
| 204. Philosophy of Law | 234. Problems in the Philosophy of Science |
| 205. Philosophy of History | 241. Symbolic Logic |
| 208. Political Values | *250. Philosophical Analysis |
| 211. Plato | 251. Epistemology |
| 217. Aristotle | 252. Metaphysics |
| 218. Medieval Philosophy | 253. Philosophy of Mind |
| *219. Kant's Moral Philosophy | 260. Wittgenstein |
| †225. British Empiricism | 287, 288. Foundations of Mathematics |
| 227. Continental Rationalism | *291, 292. Critical Philosophy |
| 228. Recent and Contemporary Philosophy | 331, 332. Seminar in Special Fields of Philosophy |
| *229. American Pragmatism | |
| 230. The Meaning of Religious Language | |
| 231. Classical German Philosophy | |

*Offered on demand.

†Not offered in 1972-73.

Physical Therapy

The Department of Physical Therapy offers a graduate program leading to the M.S. degree. Before undertaking graduate work in physical therapy a student should have a background in the basic sciences and social sciences including course work in biology, chemistry, physics, psychology, and mathematics. As part of the prescribed curriculum of the first year students are required to take Anatomy 300 and Physiology 200. Further information may be obtained from the Director of Graduate Studies, Department of Physical Therapy, Box 3247, Duke University Medical Center.

Professor

Miriam J. Jacobs, Ph.D. (Alabama), *Chairman and Director of Graduate Studies*.

Assistant Professors

Elia E. Villanueva, M.A. (Duke); Jane S. Mathews, M.P.H. (North Carolina).

Courses of Instruction

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| 201, 202. Seminar in Physical Therapy | 301. Introduction to Scientific Inquiry |
| 217. Physical Therapy Dynamics I | *315. Curriculum Development |
| 218. Physical Therapy Dynamics II | 316. Directed Teaching in Physical Therapy |
| 220. Physical Therapy Dynamics III | *320. Sensorimotor Mechanisms Related to Rehabilitation |
| 230. Physical Evaluation and Instrumentation | *322. Case Conferences in Rehabilitation |
| 234. Introductory Pathology | 332. Administration of Physical Therapy Services |
| 236. Medical Sciences | 341-342. Advanced Seminar—Selected Problems |
| *238. Introduction to Health Service Systems | 350. Research |
| 242. Directed Clinical Experience in Physical Therapy I | |
| 243. Directed Clinical Experience in Physical Therapy II | |

*Offered on demand.

Microbiology and Immunology

Prerequisites for admission include undergraduate training in the physical as well as biological sciences and minimally include general physics, calculus, organic chemistry, and physical chemistry. Provisional admission is granted to those who agree to make up deficiencies at Duke. GRE scores in verbal, quantitative, and advanced examinations weigh heavily in determining fellowship awards. NIH traineeships and NDEA Title IV Fellowships are available for full-time study in microbiology and in immunology. A candidate for the Doctor of Philosophy degree in microbiology must pass both written and preliminary examinations. These are given after the language requirements have been fulfilled and the student has earned 60 units of credit. A brochure describing the Doctor of Philosophy program and research in the department can be obtained by writing the Director of Graduate Studies.

Professors

D. Bernard Amos, M.D. (Guy's Hospital, London); Joseph Willis Bears, M.D. (Vanderbilt); Norman Francis Conant, Ph.D. (Harvard), *James B. Duke Professor of Microbiology*; Eugene D. Day, Ph.D. (Delaware), *Director of Graduate Studies*; Wolfgang Karl Joklik, D. Phil. (Oxon), *Chairman*; Hilda Pope Willett, Ph.D. (Duke).

Associate Professors

C. Edward Buckley, III, M.D. (Duke); Richard O. Burns, Ph.D. (Illinois); Richard S. Metzgar, Ph.D. (Buffalo); Suydam Osterhout, M.D. (Duke), Ph.D. (Rockefeller Institute); Robert W. Wheat, Ph.D. (Washington Univ.).

Assistant Professors

Peter K. Lauf, M.D. (Freiburg, West Germany); Ronald B. Luftig, Ph.D. (Chicago); Jack L. Nichols, Ph.D. (Alberta); Samuel R. Oleinick, M.D. (Michigan), Ph.D. (Pennsylvania); Wendell F. Rosse, M.D. (Chicago); David W. Scott, Ph.D. (Yale); Ralph Smith, Ph.D. (Colorado); Thomas C. Vanaman, Ph.D. (Duke); Frances Ellen Ward, Ph.D. (Brown); Hans Zweerink, Ph.D. (Cornell).

Courses of Instruction

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| 215. Bacteriophage: Structure and Function | 291. Immunology I |
| 219. Molecular and Cellular Basis of Development | 292. Immunology II |
| 219S. Seminar | 304. Basic Medical Virology |
| 251. Biochemistry of Development | 311. Immunochemistry |
| 252. Virology | 313. Immunohematology |
| 281. Bacterial Physiology I | 323. Readings in Bacteriology and Immunology |
| 282. Bacterial Physiology II | 325. Medical Mycology |
| | 330. Medical Immunology |

331.1-331.8. Microbiology Seminar
332.1-332.8. Immunology Seminar
336. Immunogenetics

371. Animal Cell Biology
386. Viral Oncology
420. Cellular Immunophysiology

Pathology

The Department of Pathology offers graduate work leading to the Ph.D. degree with areas of specialization such as subcellular and molecular pathology. Course work is designed to give a broad background in classical and modern pathology with emphasis on the application of biophysical, biomathematical, and biochemical approaches. Students will be required to take such courses as are necessary to obtain this foundation, and as are best adapted to areas of specialty and research. Further information including brochures giving details of departmental facilities, staff, trainee stipends, and the M.D.-Ph.D. program are available from the Director of Graduate Studies.

Professors

Bernard F. Fetter, M.D. (Duke); Donald B. Hackel, M.D. (Harvard); Thomas D. Kinney, M.D. (Duke), *Chairman*; Joachim R. Sommer, M.D. (Munich), *Director of Graduate Studies*; F. Stephen Vogel, M.D. (Western Reserve); Benjamin Wittels, M.D. (Minnesota).

Associate Professors

William D. Bradford, M.D. (Western Reserve); Jane G. Eichlepp, Ph.D. (Iowa), M.D. (Chicago); Gordon K. Klintworth, M.D., Ph.D. (Witwatersrand); William W. Johnston, M.D. (Duke); Philip Pratt, M.D. (Johns Hopkins); Norman B. Ratliff, M.D. (Duke); James W. Wilson, Ph.D. (Kentucky), M.D. (Duke).

Adjunct Associate Professor

Carlos Kozma, M.D. (Buenos Aires).

Assistant Professors

Henry Sage, Ph.D. (Yale); George Spooner, Ph.D. (North Carolina); Craig Tisher, M.D. (Washington Univ.).

Courses of Instruction

219. Molecular and Cellular Basis of Development
219S. Seminar
250. General Pathology
251. Laboratory in General Pathology
325. Cardiovascular Pathology
352. Basic Problems in Chemical Pathology
353. Advanced Neuropathology
355, 356. Graduate Seminar in Pathology
357. Research in Pathology
358. Cellular and Subcellular Pathology

360. Topochemistry
361, 362. Autopsy Pathology
364. Systemic Pathology
367, 368. Special Topics in Pathology
369. Ophthalmic Pathology
370. Developmental Pathology and Teratology
371. Comparative Pathology
372. Reaction to Drug Injury
373. Cytopathology

Physics

The Department of Physics offers graduate work for students wishing to earn the A.M. or Ph.D. degree. In addition to a balanced program of basic graduate courses, the department offers specialized courses and seminars in several fields of high current interest, in which research is being done by students, faculty, and staff.

With the help of faculty advisers, each student selects a course program to fit his needs, including work in a minor field, usually mathematics or chemistry. Students are encouraged to begin research work early in their career.

The department does not ordinarily accept students for work toward the A.M. degree only, and students making good progress are advised to work directly for the Ph.D. The option of taking the A.M. without thesis is available, with the approval of a departmental committee.

A reading knowledge of one language, usually chosen from French, German, or Russian, is required for the Ph.D. degree.

Professors

L. C. Biedenharn, Jr., Ph.D. (MIT); Edward G. Bilpuch, Ph.D. (North Carolina); Henry A. Fairbank, Ph.D. (Yale), *Chairman*; Walter Gordy, Ph.D. (North Carolina), LL.D., D.H.C., *James B. Duke Professor of Physics*; Eugene Greuling, Ph.D. (Indiana); Harold W. Lewis, Ph.D. (Duke); Horst Meyer, D.Sc. (Geneva); Henry W. Newsome, Ph.D. (Chicago), *James B. Duke Professor of Physics*; Hugh G. Robinson, Ph.D. (Duke); William D. Walker, Ph.D. (Cornell).

Adjunct Professors

Herman Robl, Ph.D. (Vienna); Katherine Way, Ph.D. (North Carolina).

Associate Professors

Ron Y. Cusson, Ph.D. (California Institute of Technology); Lawrence E. Evans, Ph.D. (Johns Hopkins), *Director of Graduate Studies*; Lloyd R. Fortney, Ph.D. (Wisconsin); Russell Roberson, Ph.D. (Johns Hopkins); Richard L. Walter, Ph.D. (Notre Dame).

Assistant Professors

Dwight W. Carpenter, Ph.D. (Illinois); Frank C. DeLucia, Ph.D. (Duke); Thomas G. Dzubay, Ph.D. (Minnesota); Moo-Young Han, Ph.D. (Rochester); Eberhard Karl Riedel, Ph.D. (Munich); Carl M. Rose, Ph.D. (Chicago); John Sykes, Ph.D. (Birmingham).

Courses of Instruction

- | | |
|---|---|
| *209. Introduction to Solid State Physics | *310. Advanced Solid State Physics |
| 212. Phase Transitions and Critical Phenomena | 316. Principles of Quantum Theory |
| 215. Introduction to Quantum Mechanics | 317. Intermediate Quantum Theory |
| 217, 218. Advanced Physics Laboratory and Seminar | 318, 319. Electromagnetic Field Theory |
| 220. Advanced Electronics | *330. Nuclear Structure Theory |
| *221, 222. Theoretical Physics | *331. Microwave Radiation |
| 223, 224. Electricity and Magnetism | *335. Microwave Spectroscopy |
| 302. Advanced Mechanics | *341. Advanced Topics in Quantum Theory |
| 303. Statistical Mechanics | *342. Theory of Elementary Particles |
| *304. Advanced Topics in Statistical Mechanics | *343. Nuclear Physics |
| 305. Introduction to Nuclear Physics | *344. Advanced Nuclear Physics |
| *306. Low Temperature Physics | *345. High Energy Physics |
| 308. Introduction to High Energy Physics | *346. Topics in Theoretical Physics |
| 309. Introductory Solid State Physics | 351-352. Seminar |
| | 397, 398. Low Temperature and Solid State Seminar |

*Offered on Demand.

Physiology and Pharmacology

In the Department of Physiology and Pharmacology graduate work is offered leading to the A.M. and Ph.D. degrees. Before undertaking graduate work in physiology or pharmacology a student should have a strong background in basic science including course work in mathematics, chemistry, physics, and biology. Students are accepted for graduate work who have undergraduate majors in any of the following areas: biology, chemistry, physics, or engineering. A brochure is available from the department which describes the program of study, financial assistance, facilities, and the research activities of the staff.

Professors

F. Bernheim, Ph.D. (Cambridge); J. J. Blum, Ph.D. (Chicago); George H. Hitchings, Ph.D. (Harvard); F. Jobsis, Ph.D. (Michigan); E. A. Johnson, M.D. (Sheffield, England); L. Lack, Ph.D. (Columbia); Robert Arthur Maxwell, Ph.D. (Princeton); J. W. Moore, Ph.D. (Virginia); T. Narahashi, Ph.D. (Tokyo); Charles Adams Nichol, Ph.D. (Wisconsin); E. M. Renkin, Ph.D. (Harvard); G. Somjen, M.D. (New Zealand); D. C. Tosteson, M.D. (Harvard), *Chairman*.

Associate Professors

R. E. Fellows, Jr., Ph.D. (McGill), M.D. (Duke); Johannes A. Kylstra, M.D., Ph.D. (Leiden); P. K. Lauf, M.D. (Freiburg, West Germany); T. J. McManus, M.D. (Boston); A. Ottolenghi, M.D. (Pavia, Italy); G. M. Padilla, Ph.D. (California at Los Angeles), *Director of Graduate Studies*; Herbert S. Posner, Ph.D. (George Washington); J. V. Salzano, Ph.D. (Iowa); S. Schanberg, Ph.D., M.D. (Yale); M. Wolbarsht, Ph.D. (Johns Hopkins).

Assistant Professors

N. C. Anderson, Ph.D. (Purdue); Earl F. Baril, Ph.D. (Connecticut); Howard L. Elford, Ph.D. (Cornell); Joseph C. Greenfield, M.D. (Emory); Robert Burns Gunn, M.D. (Harvard); J. Gutknecht, Ph.D. (North Carolina); Gary Kirk, Ph.D. (Yale); M. Lieberman, Ph.D. (S.U.N.Y. at Brooklyn); L. M. Mendell, Ph.D. (MIT); E. Mills, Ph.D. (Columbia); Keith H. Palmer, Ph.D. (Paris); D. W. Schomberg, Ph.D. (Purdue); James M. Schooler, Ph.D. (Wisconsin); Theodore Alan Slotkin, Ph.D. (Rochester); H. C. Wachtel, Ph.D. (New York Univ.).

Visiting Professor

J. Schoffeniels, M.D. (Liege, Belgium).

Courses of Instruction

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|---|---|
| 200. Physiology of Man | 430. Pharmacological Basis of Clinical Medicine |
| 201. Pharmacology: Mode of Action of Drugs | 431. Laboratory Methods in Pharmacology |
| 208. Respiratory System in Health and Disease | 442. Current Topics in Cardiac Muscle Physiology |
| 209. Neuronal Physiology and Pharmacology | 472. Research in Physiology and Pharmacology |
| 210, 211. Individual Study and Research | 493. Integrative and Clinical Neurophysiology and Neuropharmacology |
| 212. Marine Membrane Physiology | 495. Biochemical Pharmacology |
| 213. Cellular and Chemical Pharmacology | 401. Metabolic and Developmental Physiology and Pharmacology |
| 215. Topics in Developmental Physiology and Pharmacology | 403. Endocrinology and Reproduction |
| 216. Contractile Processes in Physiology and Pharmacology | 412. Advanced Seminar in Endocrinology and Reproductive Physiology I |
| 217. Membrane Transport Processes in Physiology and Pharmacology | 413. Advanced Seminar in Endocrinology and Reproductive Physiology II |
| 230. Molecular and Cellular Basis of Development | 414. Analysis of Physiological Systems |
| 230S. Optional Seminar offered in Conjunction with Physiology 230 | 415. Physiological Instrumentation |
| 279. Student Tutorial in Physiology and Pharmacology | 420. Cellular Immunophysiology |
| 280. Student Seminar in Physiology and Pharmacology | |

Political Science

The Department of Political Science offers graduate work leading to the A.M. and Ph.D. degrees. Before being admitted to candidacy for the Ph.D. degree, an applicant is normally expected to have qualified for the A.M. degree.

Instruction is designed to prepare the student for teaching and research, for government service, and for other work related to public affairs. Before undertaking graduate study in political science, a student is ordinarily expected to have completed at least 12 semester hours of course work in political science, including some work in American government.

Fields in which instruction is at present offered are American government and politics (including constitutional law, public administration, the legislative and judicial processes, and state and local government); comparative government and politics (including Western Europe, Southern Asia, Latin America, Africa, the Soviet Union, and the Commonwealth); political theory; international relations (including international law and international organization); and empirical theory and methodology

Candidates for the master's degree are required to show proficiency in one modern

foreign language and to submit either a thesis or thesis equivalent. The latter option is open only to students going on for the Ph.D. The thesis equivalent is defined as a major research paper substituted for the thesis on recommendation of the student's supervisor and with the approval of the Director of Graduate Studies.

The candidate for the degree of Doctor of Philosophy in political science must elect four fields, at least three of which must be selected from the fields enumerated above and one of which must be in a related department. He must also demonstrate a reading knowledge of two foreign languages which have been approved by the professor who supervises his dissertation, or he must demonstrate proficiency in one such foreign language and in the use of statistics.

Professors

M. Margaret Ball, Ph.D. (Stanford); Ralph Braibanti, Ph.D. (Syracuse), *Acting Chairman and James B. Duke Professor of Political Science*; Frederic N. Cleaveland, Ph.D. (Princeton); Robert Taylor Cole, Ph.D. (Harvard), *James B. Duke Professor of Political Science*; Samuel DuBois Cook, Ph.D. (Ohio State); Kazimierz Grzybowski, S.J.D. (Harvard); Hugh Marshall Hall, Jr., Ph.D. (Texas); John Hamilton Hallowell, Ph.D. (Princeton); Allan Kornberg, Ph.D. (Michigan); Richard H. Leach, Ph.D. (Princeton); William Simpson, Ph.D. (Duke).

Associate Professors

Peter Fish, Ph.D. (Johns Hopkins), *Director of Graduate Studies*; Sheridan Johns, III, Ph.D.

Assistant Professors

Albert Eldridge, Ph.D. (Kentucky); David Paletz, Ph.D. (California at Los Angeles); Thomas S. Spragens, Ph.D. (Duke); Richard Trilling, Ph.D. (Wisconsin); Arturo Valenzuela, M.A. (Columbia).

Courses of Instruction

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|---|---|
| 207. American Constitutional Interpretation | 253. Comparative Government and Politics: Latin America |
| 209. Problems in State Government and Politics | 271. Political Processes in Traditional and Modern Africa |
| 210. The Politics of Education | 275. The American Party System |
| 214. Comparative Administrative Law | 277. Comparative Party Politics |
| 220. Problems in International Politics | 279. The Legislative Process |
| 221. International Organization: The United Nations | 280. Comparative Government and Politics |
| 222. Empirical Theory | 285. The Judicial Process |
| 223. Political Philosophy from Plato to Machiavelli | 291. Problems of Urban Government |
| 224. Modern Political Theory | 293. Federalism |
| 225. Comparative Government and Politics—Western Europe | 310. Seminar in State and Local Government |
| 226. Theories of International Relations | 312. Seminar in Constitutional Law |
| 227. International Law | 313. Education and Public Policy |
| 229. Recent and Contemporary Political Theory | 321. Seminar in Political Theory |
| 230. American National Government | 325. Seminar in Comparative Government and Politics |
| 231. American Political Theory | 328. Seminar in International Law |
| 233. Research Methodology | 329. Seminar in International Regional Organization |
| 235. The Commonwealth | 330. Seminar in Comparative Government and Politics—Southern Asia |
| 236. Statistical Analysis | 341. Seminar in Public Administration |
| 237. Problems in American Foreign Policy | 342. Seminar in American National Government and Politics |
| 241. Public Administrative Organization and Management | 343. Seminar in the Policy Process |
| 243. Administrative and Organizational Theory and Behavior | 344. Workshop on Computer Models of Social Systems |
| 244. Administrative Law and Process | 360. Seminar in Government and Politics in the Soviet Union |
| 246. Administration and Public Policy | 361. Seminar in Foreign Relations of the Soviet Union |
| 249. Comparative Political Analysis and Political Development | |
| 250. Comparative Government and Politics—Southern Asia | |

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| 376. Seminar in Comparative Political Behavior
377. Seminar in Canadian Political Behavior
380. Seminar in African Government and Politics | 381. Seminar in Latin American Government and Politics
401. Seminar in the Commonwealth
402. Interdisciplinary Seminar in the History of the Social Sciences |
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Psychology

The department offers work leading to the Ph.D. degree. The areas of concentration are: experimental psychology, physiological and comparative psychology, social psychology, and personality-clinical psychology. All fields of specialization presuppose thorough preparation in the general methods, data, and theories of psychology. Programs of study are typically arranged to provide this common background in the first year or two, with increasing specialization in course work and research in subsequent years. Mastery of any related field, including a foreign language, may be required if it is necessary to the particular program of the student. Early in the second year of residence, the Ph.D. student is expected to have planned his further program of specialized studies; by the end of the second year, when the preliminary examination is normally taken, the doctoral dissertation plan should be formulated. An original dissertation demonstrating independent research competence and scholarship is the most important formal requirement for the Ph.D. degree.

Related work in a variety of fields is available, but the areas most relevant to graduate work in psychology are the biological sciences (zoology, neuroanatomy, physiology), mathematics and statistics, sociology and anthropology, and philosophy of science. Basic course work in statistics is normally taken in the Department of Mathematics.

Further details concerning the program of studies in psychology may be obtained from the Director of Graduate Studies in Psychology.

Professors

Irving Emanuel Alexander, Ph.D. (Princeton); Lloyd Joseph Borstelmann, Ph.D. (California); Jack Williams Brehm, Ph.D. (Minnesota); Robert Charles Carson, Ph.D. (Northwestern); Irving Thomas Diamond, Ph.D. (Chicago); Norman Guttman, Ph.D. (Indiana); Edward Ellsworth Jones, Ph.D. (Harvard), *Chairman*; Martin Lakin, Ph.D. (Chicago); Harold Schiffman, Ph.D. (Princeton); Michael Arthur Wallach, Ph.D. (Harvard).

Associate Professors

Carl John Erickson, Ph.D. (Rutgers); Robert Porter Erickson, Ph.D. (Brown); Darwyn Ellsworth Linder, Ph.D. (Minnesota); Gregory Roger Lockhead, Ph.D. (Johns Hopkins); John Staddon, Ph.D. (Harvard), *Director of Graduate Studies*; Cliff Waldron Wing, Jr., Ph.D. (Tulane).

Associate Research Professor

Mercedes Gaffron, M.D. (Munich), Ph.D. (Berlin).

Assistant Professors

David Aderman, Ph.D. (Wisconsin); John D. Coie, Ph.D. (California at Berkeley); Philip Robert Costanzo, Ph.D. (Florida); William C. Hall, Ph.D. (Duke); William Kalat, Ph.D. (Pennsylvania); Richard B. Kramer, Ph.D. (Chicago); Irwin Kremen, Ph.D. (Harvard); G. M. Robinson, Ph.D. (Chicago); Charles W. White, Ph.D. (Stanford).

Lecturers

Edward Clifford, Ph.D. (Minnesota); Elaine Kobrin Crovitz, Ph.D. (Duke); Herbert Floyd Crovitz, Ph.D. (Duke); Carl Eisdorfer, Ph.D. (New York), M.D. (Duke); Ila Gehman, Ed.D. (Pennsylvania State); Marcel Kinsbourne, M.D. (Oxford); Arnold David Krugman, Ph.D. (Kentucky); Walter Dorn Obrist, Ph.D. (Northwestern); Talmadge Lee Peele, M.D. (Duke); William Derek Shows, Ph.D. (Duke); George G. Somjen, M.D. (New Zealand); Larry W. Thompson, Ph.D. (Florida State); Lise Wallach, Ph.D. (Kansas); M.L. Wolbarsht, Ph.D. (Johns Hopkins).

Courses of Instruction

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| 203. Sensation and Perception | 292. The History of Psychology |
| 204. Comparative Psychology | 293. Methods in Developmental Psychology |
| *210. Cognition and Higher Mental Processes | 303, 304. Research |
| 211. The Problem Child | 305. Psychopathology |
| 213. Adaptive Behavior | 306. Seminar in Developmental Psychology |
| 215. Developmental Psychology | 309. Seminar in Learning |
| 216. Biological Psychology | 310. Seminar in Perception |
| 217. Social Psychology | 313. Seminar on the Concept of the Reflex |
| 219. Physiological Psychology I | 314. Seminar in Instrumental Behavior |
| 220. Physiological Psychology II | 316. Seminar in Social Psychology |
| 234. Seminar in Personality | 317. Seminar in Social Behavior |
| 236. Theoretical Psychology | 318. Seminar in Social Influence |
| 238. The Electroencephalogram and Psychological Function | 319-320. Student-Faculty Research Conference |
| 239. Behavioral Correlates of Brain Damage in Man | 324. Seminar: Behavioral Studies of the Brain |
| 245. Personality Theory I | 325. Seminar in Neuroendocrinology and Behavior |
| 246. Personality Theory II | 335-336. Clinical Psychology Practicum |
| 253. Personality Development | 337. Seminar in Sensory Discrimination |
| 271.1-4. Seminar in Selected Problems | 340. Group Processes and Sensitivity Training |
| 271.5. Comparative Neurology and Psychology | 343, 344. Advanced Seminar in Clinical Psychology |
| 273. Principles of Psychological Measurement | 347-348. Personality Assessment |
| 282. Introduction to Methods of Psychotherapy | |
| 291. Seminar in Community Mental Health | |

*Not offered in 1972-73.

Religion

The Department of Religion offers graduate work leading to the A.M. and Ph.D. degrees. Students may major in one of three fields: (1) Biblical studies; (2) historical studies; and (3) systematic and contemporary studies.

In addition to course work in these major fields, students will take such other courses in cognate fields as will contribute to the enrichment of their major studies. This minor requirement may be fulfilled either by work in a cognate department, such as Classical Studies, History, Political Science, or Sociology, or by work in a cognate field within the Department of Religion other than the field of major concentration.

The program of doctoral studies presumes a grounding in religion such as is normally derived from the course content of theoretical subjects of a seminary curriculum. Candidates for admission to the doctoral program are favored, therefore, who hold a B.D. or equivalent degree from an accredited seminary or who have had at least two years of seminary study beyond the A.B. degree. Students applying for graduate work in religion directly from an undergraduate program should have had a strong undergraduate major in religion, and will be accepted for the Ph.D. program only on the condition of satisfactory completion of the A.M. degree with the department.

Candidates for the Ph.D. degree must complete the language requirements not later than the beginning of the second year of residence.

Professors

Frank Baker, B.D., Ph.D. (Nottingham); W. Waldo Beach, B.D., Ph.D. (Yale); David Bradley, Ph.D. (Yale); Robert E. Cushman, B.D., Ph.D., L.H.D. (Yale); William David Davies, B.D., M.A., D.D. (Wales); Stuart C. Henry, B.D., Ph.D. (Duke); Frederick L. Herzog, Th.D. (Princeton); Creighton Lacy, B.D., Ph.D. (Yale); Thomas A. Langford, B.D., Ph.D. (Duke); Roland E. Murphy, S.T.D. (Catholic University); Robert Osborn, B.D., Ph.D. (Drew); Ray C. Petry, Ph.D., LL.D. (Chicago); William H. Poteat, B.D., Ph.D. (Yale); James L. Price, B.D., Ph.D.

(Cambridge); D. Moody Smith, Jr., B.D., Ph.D. (Yale); Franklin W. Young, D.B., Ph.D. (Duke), *Director of Graduate Studies*.

Associate Professors

Lloyd Richard Bailey, Ph.D. (Yale); Henry B. Clark, B.D., Ph.D. (Yale); Wesley A. Kort, B.D., Ph.D. (Chicago); Eric M. Meyers, Ph.D. (Harvard); Harry B. Partin, B.D., Ph.D. (Chicago); Charles K. Robinson, B.D., Ph.D. (Duke); Harmon L. Smith, B.D., Ph.D. (Duke); David Curtis Steinmetz, Th.D. (Harvard); Orval Wintermute, B.D., Ph.D. (Johns Hopkins).

Assistant Professor

James H. Charlesworth, B.D., Ph.D. (Duke).

BIBLICAL STUDIES

Courses of Instruction

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|--|--|
| 207. Second Hebrew | 304. Aramaic |
| 208. Second Hebrew | 305. Third Hebrew |
| 209. Biblical Theology | 306. Language and Literature of the Dead Sea Scrolls |
| 223A. Exegesis of the Hebrew Old Testament: Amos and Hosea | 307. Syriac |
| 225. Living Issues in New Testament Theology | 309. History of the Ancient Near East |
| 226A. Exegesis of the Greek New Testament I (Mark and Matthew) | 312. Pauline Theology |
| 226B. Exegesis of the Greek New Testament I (Romans) | 314. Judaism and Christianity in the New Testament |
| 227A. Exegesis of the Greek New Testament II (Luke-Acts) | 319. The Gospel According to St. Matthew in Recent Research |
| 227B. Exegesis of the Greek New Testament II (Galatians) | 340-341. Seminar in the New Testament |
| 227C. Exegesis of the Greek New Testament II (The Pastoral Epistles) | 342. The Archaeology of Palestine in Hellenistic-Roman Times |
| 228. The Theology of the Gospel and Epistles of John | 345. The Epistle to the Hebrews in Recent Research |
| 258. Coptic | 350-351. Old Testament Seminar |
| 302. Studies in the Intertestamental Literature | 373-374. Elementary Akkadian |
| | 375-376. Elementary Ugaritic |
| | 401-402. Colloquium in Biblical Studies |

HISTORICAL STUDIES

- | | |
|--|---|
| 241. Problems in Reformation Theology | 332. The Medieval Church |
| 251. The Counter-Reformation and the Development of Catholic Dogma | 334. Church Reformers and Christian Unity |
| 260. Seminar: Wesley Studies | 335. The English Church in the Eighteenth Century |
| 280. The History of Religions | 336. Christian Mysticism in the Middle Ages |
| 283. Religions of East Asia | 338. Calvin and the Reformation in Switzerland |
| 284. The Religion and History of Islam | 339. The Radical Reformation |
| 285. Origins of Indian Civilization | 391. Historical Types of Christian Ethics I |
| 289. World Religions and Social Change | 392. Historical Types of Christian Ethics II |
| 296. Religion on the American Frontier | 395. Christian Thought in Colonial America |
| 308. Greek Patristic Texts | 396. Liberal Traditions in American Theology |
| 313. The Apostolic Fathers | |
| 315-316. Seminar: History of Religions | |
| 317. Seminar in the Greek Apologists | |
| 318. Seminar in the Greek Fathers | |
| 331. The Social Message of the Early and Medieval Church | |

SYSTEMATIC AND CONTEMPORARY STUDIES

- | | |
|--|---|
| 210. Contemporary British Theology | 231. Seminar in Christianity and Contemporary Thought |
| 211. Authority in Theology | |
| 230. The Meaning of Religious Language | |

- 232. Religion and Literature: Perspectives and Methods
- 233. Modern Narrative and Religious Language
- 248. The Theology of Karl Barth
- 249. The Church in Contemporary Theology
- 281. Phenomenology and Religion
- 292. Christian Ethics and International Relations
- 293. Sociological Analysis of Religion
- 294. Institutional Analysis of Religious Bodies
- 295. Ethics and Economic Life
- 300. Systematic Theology
- 303. The New Hermeneutic and the Concept of History
- 320. Hegel and Schleiermacher
- 322. Nineteenth-Century European Theology
- 325. Philosophical Theology I
- 326. Philosophical Theology II
- 328. Twentieth-Century European Theology
- 333. Seminar: Marxist Ideology and Christian Faith
- 380. Existentialist Thought
- 383. Moral Theology in the Twentieth Century
- 384. Religious Dissent in American Culture
- 385. Religion in American Literature
- 386. Christianity in Dialogue with Other Faiths
- 388. Ethics and Medicine
- 389. Christian Ethics and Contemporary Culture
- 390. Current Problems in Christian Ethical Theory
- 394. Christianity and the State
- 397. Contemporary American Theology
- 398. Colloquium on the College and University Teaching of Religion

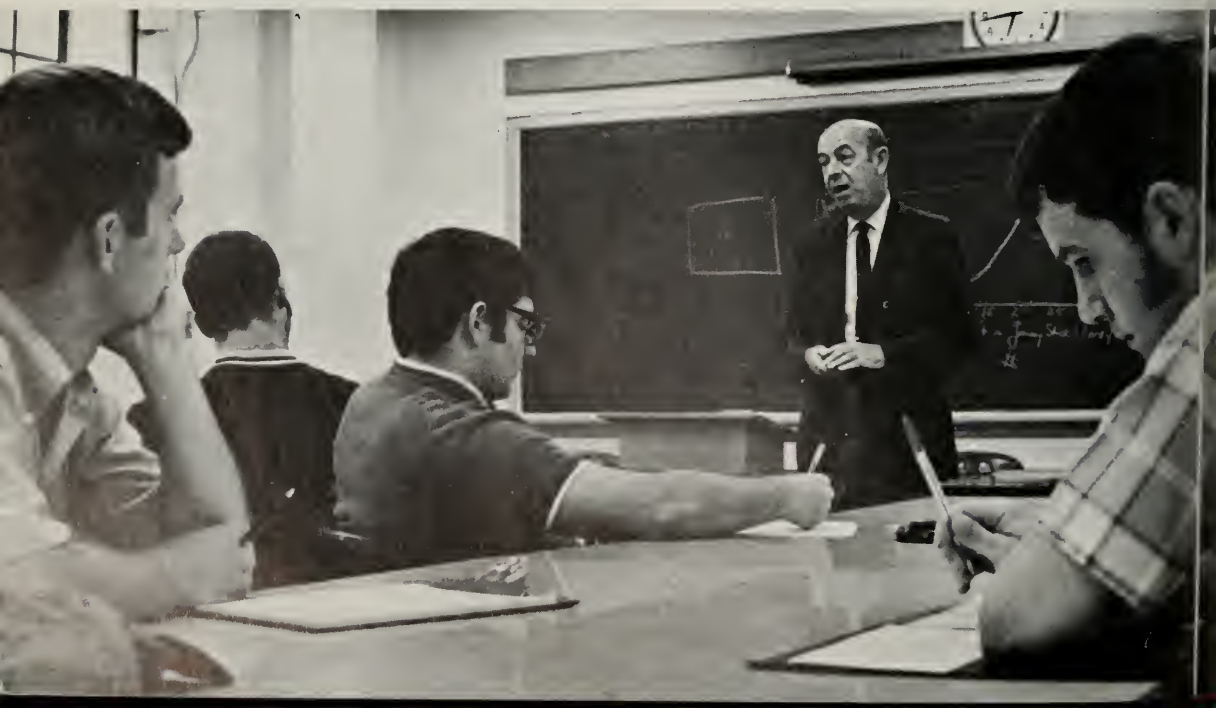
Romance Languages

The Department of Romance Languages offers graduate work leading to the A.M., M.A.T., and Ph.D. degrees in French and Spanish. Requirements for the A.M. may be completed by submission of a thesis or by passing a comprehensive examination in the major field. It is hoped that candidates for either the A.M. and Ph.D. degree will minor in a second Romance language; however, minor work may be taken in any one or two of a number of other subject areas.

In order to undertake graduate study in Romance languages, the entering student should have credit for at least 18 semester hours (or equivalent) above the intermediate level in the major language.

Professors

Thomas Howard Cordle, Ph.D. (Yale); Gifford Davis, Ph.D. (Harvard); John Morton Fein, Ph.D. (Harvard), *Chairman*; Wallace Fowlie, Ph.D. (Harvard); Richard Lionel Predmore, D.M.L. (Middlebury); Marcel Tetel, Ph.D. (Wisconsin); Bruce W. Wardropper, Ph.D. (Pennsylvania).



Associate Professors

Alexander Hull, Ph.D. (Washington); Patrick R. Vincent, Ph.D. (Johns Hopkins), *Director of Graduate Studies*.

Assistant Professors

Louis E. Auld, Ph.D. (Bryn Mawr); Ernesto Caserta, Ph.D. (Harvard).

Visiting Professor

Robert Niess, Ph.D. (Minnesota).

FRENCH

Courses of Instruction

- | | |
|---|---|
| 209. Advanced Composition and Syntax | 228. French Poetry of the Twentieth Century |
| 210. The Structure of French | 233. Contemporary French Theater |
| 213, 214. French Literature of the Seventeenth Century | 234. Proust |
| 217. Mallarme and Rimbaud | 236. Baudelaire |
| 219. Old French Literature | 241, 242. French Literature and Thought in the Age of Enlightenment |
| 221, 222. The Nineteenth-Century French Novel | 245, 246. French Literature of the Twentieth Century |
| 223. French Literary Criticism | 311, 312. French Seminar |
| 224. History of the French Language | ———. Graduate Reading Course |
| 225, 226. From Renaissance to Baroque in French Literature of the Sixteenth Century | |

ITALIAN

- | | |
|-------------------------------------|----------------------|
| 283. Italian Novel of the Novecento | 288. The Renaissance |
| 284. Dante | |

SPANISH

- | | |
|---|---|
| 251. The Origins of the Spanish Novel | 259. Spanish Phonetics |
| 252. Spanish Lyric Poetry Before 1700 | 261. Nineteenth-Century Novel |
| 253. The Origins of the Spanish Theater | 262. Galdos |
| 255, 256. Modern and Contemporary Latin American Literature | 265. Golden Age Literature: Cervantes |
| 257. Old Spanish | 266. Golden Age Literature: The Drama |
| 258. Old Spanish Literature | 275, 276. Contemporary Spanish Literature |
| | 321, 322. Hispanic Seminar |

ROMANCE LANGUAGES

218. The Teaching of Romance Languages

Slavic Languages and Literature

The Department of Slavic Languages and Literatures inaugurated in 1971 a graduate program leading to the A.M. degree. Initially, graduate students will be able to major only in Russian language and literature, but there will be limited training in the language and literature of Poland.

Applicants should have sufficient undergraduate preparation in the Russian language to enable them to read Russian classical literature in the original.

Associate Professors

Bronislas de Leval Jezierski, Ph.D. (Harvard); Magnus J. Krynski, Ph.D. (Columbia), *Chairman and Director of Graduate Studies*.

Assistant Professors

Ludmila A. Foster, Ph.D. (Harvard); Michael I. Pavlov, Ph.D. (Leningrad).

Lecturer

Judith H. Gogolewski, Ph.D. (Vanderbilt).

Courses of Instruction

- 201, 202. The Novelists of Nineteenth-Century Russia
203. The Slavs: Literature and Culture, 1918-1939
204. The Slavs: Literature and Culture, 1940-1970
*205. The Structure of Polish in Relation to Russian
*206. Readings in Contemporary Polish Prose in the Original
207. Soviet Literature and Culture
212. Pushkin
215, 216. Advanced Composition and Syntax
*224. The Russian Short Story—Eighteenth Century to the Present
225. Tolstoy
*227. Gogol
230. Chekhov and the Russian Prose of the Turn of the Century
232. Fyodor Dostoevsky
*233. Ivan Turgenev
*236. Russian and Polish Romanticism
237. Survey of Old Russian Literature and Civilization
*238. Russian Literature of the Eighteenth and Early Nineteenth Centuries
*240. Twentieth-Century Russian Poetry

*Not offered in 1972-73.

Sociology and Anthropology

The department offers graduate work leading to a Ph.D. degree in sociology and in anthropology. Before undertaking advanced work in this department, a student must have completed a minimum of 12 semester hours of approved preliminary courses in his chosen discipline, and an additional 12 semester hours in the field or in related work. Applicants for admission should submit scores on the Graduate Record Examination, especially the Aptitude test.

Candidates for the Ph.D. degree in sociology are expected to demonstrate in qualifying and preliminary examinations a broad background in the various aspects of sociology—substantive, theoretical, and empirical. The program of each candidate is determined by a committee which reviews his previous work and sets the specific requirements to be met. These requirements will include work in related fields such as anthropology, economics, mathematics, philosophy, political science, or psychology. Emphasis is placed on the completion of the dissertation, directed by a member of the staff, demonstrating competence and independence in the investigation of an original and significant problem.

Candidates for the Ph.D. degree in anthropology must show evidence by preliminary or qualifying examination of a command of a major field within the discipline. The department recognizes the trend in modern anthropology toward interdisciplinary research, and part of the anthropology course requirements may be replaced by advanced work in anatomy, economics, sociology, zoology, and other disciplines relevant to the student's program.

Further details of these programs, the departmental facilities, the staff, and various stipends available are described in a brochure which may be obtained from either the Director of Graduate Studies for Sociology or the Director of Graduate Studies for Anthropology, Department of Sociology and Anthropology.

Professors

Kurt W. Back, Ph.D. (MIT), *Acting Chairman*; John Buettner-Janusch, Ph.D. (Michigan); Alan C. Kerckhoff, Ph.D. (Wisconsin); Weston LaBarre, Ph.D. (Yale); George L. Maddox, Jr., Ph.D. (Michigan State); John C. McKinney, Ph.D. (Michigan State); George C. Myers, Ph.D. (Washington); Jack H. Preiss, Ph.D. (Michigan State); Donald F. Roy, Ph.D. (Chicago); Joel Smith, Ph.D. (Northwestern); Edward A. Tiryakian, Ph.D. (Harvard); John Wilson, D.Phil. (Oxford), *Director of Graduate Studies for Sociology*.

Associate Professors

Mahadeo L. Apte, Ph.D. (Wisconsin); J. Christopher Crocker, Ph.D. (Harvard); Richard G. Fox, Ph.D. (Michigan); Erdman B. Palmore, Ph.D. (Columbia); Ida Simpson, Ph.D. (North Carolina).

Assistant Professors

Nancy Bowers, Ph.D. (Columbia); Lee Brehm, Ph.D. (North Carolina); Robert B. Hartford, Ph.D. (Cornell); William Maxwell Mason, Ph.D. (Chicago); Arvin W. Murch, Ph.D. (Yale); William M. O'Barr, Ph.D. (Northwestern), *Director of Graduate Studies in Anthropology*.

SOCIOLOGY

Courses of Instruction

- | | |
|---|--|
| 241. Social Stratification | 325. Social Aspects of Mental Illness and Treatment |
| 242. The Sociology of Occupations and Professions | 341. Special Problems of Complex Systems |
| 243. Population Dynamics and Social Change | 344. Workshop on Computer Models of Social Systems |
| 247. Community and Society | 345, 346. Demographic Techniques I and II |
| 251. The Sociology of Modernization | 351, 352. Seminar in Social Organization |
| 253. Social Institutions | 361. Seminar in Comparative Sociology |
| 255. Race and Culture | 373, 374. Social Psychological Issues in Sociology |
| 259. Religion and Social Change | 381. Development of Sociological Theory |
| 272. The Socialization Process | 385, 386. Seminar in Sociological Theory |
| 275. Social Attitudes and Individual Behavior | 392. Individual Research in Sociology |
| 278. Social Structure and the Life Cycle | 397, 398. Seminar in Special Research Problems |
| 295. Methodology in Sociology | 402. Interdisciplinary Seminar in the History of the Social Sciences |
| 297. Statistical Analysis in Sociology | |
| 301. Seminar in Human Fertility | |
| 302. Seminar in Migration | |

ANTHROPOLOGY

- | | |
|---|---|
| 220. Society and Culture in India | 266. Personality and Culture |
| 222. Topics in African Anthropology | 276. Analysis of Kinship Systems |
| 231. Human Evolution I | 278. Special Topics in Political Anthropology |
| 232. Human Evolution II | 280, 281. Seminar in Selected Topics |
| 236. Human Genetics | 291, 292. Anthropological Theory |
| 238. Language and Society | 330. Seminar in Anthropology |
| 240. Indo-Aryan Linguistics | 333. Primate Evolution |
| 242. Topics of Prehistory | 334. Topics in Physical Anthropology |
| 249. Economic Anthropology | 393. Individual Research in Anthropology |
| 260. Linguistic Anthropology: Phonemics | 402. Interdisciplinary Seminar in the History of the Social Sciences |
| 261. Linguistic Anthropology: Morphology and Syntax | 410. Seminar in the Government, History, and Social Structure of India and Pakistan |
| 262. Anthropology of Law | |
| 263. Primitive Art and Music | |
| 264. Primitive Religion | |
| 265. Personality and Society | |

Zoology

The Department of Zoology manages a variety of programs tailored to individual needs of students seeking A.M. or Ph.D. degrees.

In general, a student entering the department will be equipped to pursue an advanced degree if he has completed an undergraduate major in biology along with some formal training in college-level chemistry, mathematics, physics, and foreign languages.

Nevertheless, in recognition and support of the modern trend toward interdisciplinary research, the department is prepared to accept promising students with less orthodox academic backgrounds and is ready to encourage any student wishing to undertake a program of study leading, in effect, to an interdisciplinary degree sponsored by the department.

Thus, all students are urged to search widely in the *Bulletin of Undergraduate Instruction* and the official detailed *Bulletin of the Graduate School* for information about the intellectual resources of the University. Special attention, perhaps

should be given to announcements of the Departments of Anatomy, Biochemistry, Botany, Chemistry, Geology, History, Mathematics, Microbiology and Immunology, Philosophy, Physics, Physiology and Pharmacology, Psychology, Sociology and Anthropology, and Zoology; announcements of the Schools of Engineering and Forestry should also be consulted.

Professors

Joseph R. Bailey, Ph.D. (Michigan); Cazlyn G. Bookhout, Ph.D. (Duke); John Buettner-Janusch, Ph.D. (Michigan); John D. Costlow, Jr. (Duke); Donald J. Fluke, Ph.D. (Yale), *Chairman*; John R. Gregg, Ph.D. (Princeton); Peter H. Klopfer, Ph.D. (Yale); Daniel A. Livingstone, Ph.D. (Yale); R. Bruce Nicklas, Ph.D. (Columbia); Knut Schmidt-Nielsen, Dr.Phil. (Copenhagen); Karl M. Wilbur, Ph.D. (Pennsylvania).

Associate Professors

Richard T. Barber, Ph.D. (Stanford); Nicholas W. Gilham, Ph.D. (Harvard); Vance A. Tucker, Ph.D. (California at Los Angeles); Stephen A. Wainwright, Ph.D. (California), *Director of Graduate Studies*; Calvin L. Ward, Ph.D. (Texas).

Adjunct Associate Professor

Klaus Schmidt-Koenig, Ph.D. (Freiburg).

Assistant Professors

Richard B. Forward, Ph.D. (California at Santa Barbara); John G. Lundberg, Ph.D. (Michigan); John P. Sutherland, Ph.D. (California at Berkeley).

Courses of Instruction

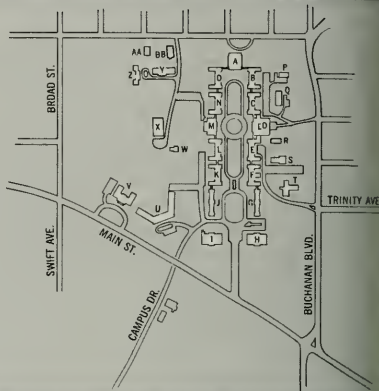
- | | |
|--|--|
| 201. Animal Behavior | 252. Comparative Physiology |
| 203. Marine Ecology | 271. Cell Physiology |
| 205. Elements of Theoretical Biology | 274. Marine Invertebrate Zoology |
| 212. Marine Membrane Physiology | 275. Invertebrate Zoology |
| 213. Ecological Oceanography | 276. Comparative and Evolutionary Biochemistry |
| 214. Biological Oceanography | 278. Invertebrate Embryology |
| 216. Limnology | 280. Principles of Genetics |
| 224. Vertebrate Zoology | 283. Developmental and Cellular Genetics |
| 229. Morphogenetic Systems | 288. The Cell in Development and Heredity |
| 236. Human Genetics | 295, 296. Seminar |
| 240. Chemical Oceanography | 333. Primate Evolution |
| 242. Cytological Materials | 334. Topics in Physical Anthropology |
| 243. Cytology | 351, 352. Departmental Seminar |
| 244. Topics in Cell Structure and Function | 353, 354. Research |
| 245. Radiation Biology | 355, 356. Seminar |
| 246. Physical Biology | 360, 361. Tutorials |
| 248. Introductory Biochemistry | 394. Marine Membrane Physiology |
| 250. Physiological Ecology of Marine Animals | |



MAP OF DUKE UNIVERSITY

East Campus

- | | | | |
|---|-------------------------|----|------------------------------|
| A | Baldwin Auditorium | O | Pegram House |
| B | Bassett House | P | Duke Press |
| C | Brown House | Q | Infirmary |
| D | Union Building | R | Ark |
| E | Faculty Apartments | S | Crowell Building |
| F | Art Museum, Geology | T | Epworth Inn |
| G | Aycock House | U | Gilbert-Addoms House |
| H | East Duke Building | V | Southgate Hall |
| I | West Duke Building | W | Campus Center |
| J | Jarvis House | X | Woman's College
Gymnasium |
| K | Carr Building | Y | Asbury Building |
| L | Giles House | Z | Bivins Building |
| M | Woman's College Library | AA | Art Building |
| N | Alpspaugh House | BB | Branson Building |



West Campus

- | | | | |
|--------------------------|-------------------------|----------------------|---|
| Duke Chapel | Hospital Main Entrance | O Craven Quadrangle | V Card Gymnasium |
| B Divinity School | I Gerontology, D & T, | P Wannamaker Hall | W Indoor Stadium |
| C Gray Building | J Clinical Research | Q Crowell Quadrangle | X School of Law |
| D Perkins Library | J Duke Hospital | R Clock Tower Court | Y Gross Chemical Laboratory |
| E Language Center | K Sociology, Psychology | S Kilgo Quadrangle | Z Biological Sciences |
| F Old Chemistry Building | L Social Sciences | T Union Building | AA Plant Environment Laboratory |
| G Davison Building | M Allen Building | U Flowers Building | BB Physics Building |
| School of Medicine | N Few Quadrangle | Page Auditorium | CC Nuclear Laboratory |
| | | | DD School of Engineering |
| | | | EE Army Research |
| | | | FF Medical Center Research Buildings |
| | | | GG Nanaline H. Duke Medical Sciences Building |
| | | | HH Warehouse, Shop |
| | | | II Bell Building |
| | | | JJ Hanes House |
| | | | School of Nursing |
| | | | KK Hanes House Annex |
| | | | LL Pickens Rehabilitation Center |
| | | | MM Graduate Center |
| | | | NN Alumni House |
| | | | OO Commonwealth-Studies Center |
| | | | PP Personnel Office |
| | | | QQ International House |
| | | | RR Personnel Office |
| | | | SS Education Improvement Program, |
| | | | A Better Chance Program |
| | | | TT International Studies Center |
| | | | UU Campus Stores Office |
| | | | VV Office of Institutional Advancement |
| | | | WW Information Services |
| | | | Visitors Bureau |
| | | | XX Admissions Office |
| | | | YY Edens Quadrangle |
| | | | ZZ Wade Stadium |
-







Bulletin of Duke University 1972-1973

Graduate School



Bulletin of Duke University

Graduate School

1972-1973

Durham, North Carolina 1972

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Calendar of the Graduate School 1972-73

Summer Session 1972

April

- 3-4 Monday-Tuesday—Preregistration for fall and summer 1972.
- 14 Friday—Final date for completing application for admission to the summer session, Term I.

May

- 12 Friday—Completion of registration for Term I.
- 15 Monday—Final date for completing application for admission to the summer session, Term II.
- 15 Monday—First class day except for undergraduate courses in chemistry, geology, and physics.
- 20 Saturday—Classes will be held.
- 22 Monday—First class day of chemistry, geology, and physics.

June

- 3 Saturday—Classes will be held.
- 15-16 Thursday-Friday—Final examinations for Term I.
- 16 Friday—Final date for completing application for admission to the summer session, Term III.
- 16 Friday—Completion of registration for Term II.
- 19 Monday—First class day for all courses in Term II.
- 24 Saturday—Classes will be held.
- 30 Friday—Final date to register for English examination. Registration is taken in the Graduate School Office. This examination is open only to students eligible to use English as a foreign language.

July

- 5 Wednesday—Examination for students electing English for a foreign language requirement; room and hours to be announced.
- 15 Saturday—Classes will be held.
- 20-21 Thursday-Friday—Final examinations for Term II.
- 21 Friday—Completion of registration for Term III.
- 24 Monday—First class day for Term III.
- 29 Saturday—Classes will be held.

August

- 1 Tuesday—Final date for filing with the Graduate School Office the Statement of Intention to complete requirements for an advanced degree during the summer session. If a thesis is to be presented, the title is to be filed at the same time as the Statement of Intention.
- 5 Saturday—Classes will be held.
- 15 Tuesday, 12:00—Last day for submitting theses for advanced degrees.
- 24-25 Thursday-Friday—Final examinations for Term III.

Academic Year 1972-73

- 28-30 Monday-Wednesday—Pre-enrollment in the Graduate Office for new students.
- 29-31 Tuesday-Thursday—Consultation with directors of graduate study concerning course program.
- 30 Wednesday—English examination for foreign students; 2:00 p.m., 111 Biological Sciences Building. (See chapter on Admission for section on additional Procedures for Foreign Students.)

September

- 1 Friday—Registration for new and non-preregistered returning students. Indoor Stadium.
- 2 Saturday—Final date for changing registration with reduction in fees. (See October 5 for changes resulting from passing a preliminary examination.)
- 5 Tuesday, 9:00 a.m.—Fall semester classes begin.
- 15 Friday—Final date for changes in registration which involve adding courses, provided no reduction in fees is entailed.
- 29 Friday—Final date for dropping course-seminar registration and adding equivalent units of research.

October

- 6 Friday—Final date for change in registration resulting from passing a preliminary examination.
- 25 Wednesday—Final date to register for English examination. Registration is taken in the Graduate School Office. This examination is open only to students eligible to use English as a foreign language requirement.
- 30-31 Monday-Tuesday—Preregistration for spring, 1973.

November

- 1 Wednesday—Examinations for students electing English for a foreign language requirement; room and hours to be announced.
- 21 Tuesday, 6:00 p.m.—Thanksgiving recess begins.
- 27 Monday, 9:00 a.m.—Classes are resumed.

December

- 1 Friday—Final date for applying for admission to the spring semester.
- 7-13 Thursday-Wednesday—Reading period.
- 9 Saturday—Founders' Day.
- 14 Thursday—Final examinations begin.
- 21 Thursday—Final examinations end.

January

- 10 Wednesday—English examination for foreign students: 2:00 p.m., 309 Flowers Building. (See chapter on Admission for section on Additional Procedures for Foreign Students.)
- 13 Saturday—Final registration of preregistered students. Registration for students not in residence during the fall semester and for current students who failed to register. Final date for changing registration with reduction in fees. (See February 19 for changes resulting from passing a preliminary examination.)
- 15 Monday, 9:00 a.m.—Spring semester classes begin.
- 29 Monday—Final date for changes in registration which involve adding courses, provided that no reduction in fees is entailed.

February

- 1 Thursday—Final date for filing with the Graduate School Office the Statement of Intention of receiving an advanced degree in May. Titles of theses and dissertations are to be filed concurrently with the Statement of Intention.
- 12 Monday—Final date for dropping course-seminar registration and adding equivalent units of research.
- 19 Monday—Final date for change in registration resulting from passing preliminary examination.

March

- 9 Friday—Final date to register for English examination. Registration is taken in the Graduate School Office. This examination is open only to students eligible to use English as a foreign language requirement.
- 16 Friday—Examination for students electing English for a foreign language requirement; room and hours to be announced.
- 16 Friday, 6:00 p.m.—Spring recess begins.
- 26 Monday, 9:00 a.m.—Classes are resumed.

April

- 2 Monday—Last day for submitting dissertations for degrees of Doctor of Philosophy and Doctor of Education.
- 2-3 Monday-Tuesday—Preregistration for fall and summer 1973.
- 16 Monday—Last day for applying for admission to the summer session, Term I.
- 16 Monday—Last day for submitting theses for degrees of Master of Arts, Master of Science, Master of Education, and Master of Arts in Teaching.
- 24-30 Tuesday-Monday—Reading period.

May

- 1 Tuesday—Final examinations begin.
- 7 Monday—Final examinations end.
- 12 Saturday—Commencement begins.
- 13 Sunday—Commencement Sermon and Graduation Exercises.
- 15 Tuesday—Final date for completing application for admission to the summer session, Term II.

University Administration

General Administration

Terry Sanford, J.D., LL.D., D.H., L.H.D., D.P.A., *President*
John O. Blackburn, Ph.D., *Chancellor*
Frederic N. Cleaveland, Ph.D., *Provost*
Charles B. Huestis, *Vice President for Business and Finance*
William G. Anlyan, M.D., *Vice President for Health Affairs*
Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*
Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*
Harold W. Lewis, Ph.D., *Vice Provost and Dean of the Faculty*
John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*
James L. Price, Ph.D., *Vice Provost and Dean of Undergraduate Education*
*Craufurd D. Goodwin, Ph.D., *Vice Provost and Director of International Programs*
Thomas F. Keller, Ph.D., *Vice Provost*
Joel L. Fleishman, LL.M., *Vice Chancellor for Public Policy Education and Research; Director of Institute of Policy Sciences and Public Affairs*
Benjamin Edward Powell, Ph.D., *Librarian*
Clark R. Cahow, Ph.D., *University Registrar*
J. Peyton Fuller, A.B., *Controller*
Rufus H. Powell, LL.B., *Secretary of the University*
Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Assistant Treasurer*
Victor A. Bubas, B.S., *Assistant to the President*
A. Kenneth Pye, LL.M., *University Counsel*

*Leave of absence through August, 1972.

Graduate School Administration

John C. McKinney, Ph.D., *Dean of the Graduate School*
Dale B. J. Randall, Ph.D., *Associate Dean*
Charles M. Harman, Ph.D., *Associate Dean*
Leesa H. Campbell, M.A., *Assistant to the Dean*
Frances C. Thomas, A.B., *Administrative Assistant*

Executive Committee of the Graduate Faculty

Irving E. Alexander*	John L. Lievsay*	John F. Oates
Lewis E. Anderson*	George L. Maddox	Joachim R. Sommer
Lawrence E. Evans	John C. McKinney	Frederick L. Thurstone*

*Term expires September, 1972.

Instructional Staff

Members of the Graduate School Faculty

(As of October 1, 1971.)

The date denotes the first year of service at Duke University.

- Frances Dorothy Acomb (1945) Ph.D., *Associate Professor of History*
Anne H. Adams (1971) Ed.D., *Associate Professor of Education*
Mark Adelman (1971) Ph.D., *Assistant Professor of Anatomy*
David Aderman (1970) Ph.D., *Assistant Professor of Psychology*
John Richard Alden (1955) Ph.D., *James B. Duke Professor of History*
Irving Alexander (1963) Ph.D., *Professor of Psychology*
A. Tilo Alt (1965) Ph.D., *Assistant Professor of German*
D. Bernard Amos (1962) M.D., *James B. Duke Professor of Immunology*
Carl Anderson (1955) Ph.D., *Professor of English*
Lewis Edward Anderson (1936) Ph.D., *Professor of Botany*
Nels C. Anderson (1966) Ph.D., *Assistant Professor of Physiology*
Roger Fabian Anderson (1950) Ph.D., *Professor of Forest Entomology*
Janis Antonovics (1970) Ph.D., *Assistant Professor of Botany*
Stanley Hersh Appel (1969) M.D., *Associate Professor of Biochemistry*
¹Mahadeo L. Apte (1965) Ph.D., *Associate Professor of Anthropology*
Richard E. Aquila (1968) Ph.D., *Assistant Professor of Philosophy*
John Leslie Artley (1955) D.Eng., *Professor of Electrical Engineering*
Louis E. Auld (1970) Ph.D., *Assistant Professor of Romance Languages*
Kurt W. Back (1959) Ph.D., *Professor of Sociology*
Joseph Randle Bailey (1946) Ph.D., *Professor of Zoology*
Lloyd Richard Bailey (1971) Ph.D., *Associate Professor of Religion*
Frank Baker (1960) Ph.D., *Professor of Religion*
Steven W. Baldwin (1970) Ph.D., *Assistant Professor of Chemistry*
Helmy Hamdollah Baligh (1967) Ph.D., *Professor of Business Administration*
²M. Margaret Ball (1963) Ph.D., *Professor of Political Science*
Robert H. Ballantyne (1962) Ed.D., *Associate Professor of Education*
Richard T. Barber (1970) Ph.D., *Associate Professor of Zoology*
Earl F. Baril (1970) Ph.D., *Assistant Professor of Clinical Pharmacology*
Robert Barker (1971), Ph.D., *Visiting Professor of Biochemistry*
Robert Lloyd Barnes (1965) Ph.D., *Professor of Forest Biochemistry*
Roger Barr (1968) Ph.D., *Assistant Professor of Pediatrics and Biomedical Engineering*
Joseph Battle (1970) Ph.D., *Associate Professor of Business Administration*
William Waldo Beach (1946) B.D., Ph.D., *Professor of Christian Ethics*
³Joseph Willis Beard (1937) M.D., *Professor of Virology*
Jan Bergeron (1968) V.M.D., *Assistant Professor of Anatomy*
Frederick Bernheim (1930) Ph.D., *James B. Duke Professor of Pharmacology*
Mary L. C. Bernheim (1930) Ph.D., *Professor of Biochemistry*
⁴L. C. Biedenharn, Jr. (1961) Ph.D., *Professor of Physics*
William Dwight Billings (1952) Ph.D., *James B. Duke Professor of Botany*
⁵Edward George Bilpuch (1962) Ph.D., *Professor of Physics*
David E. Black (1970) Ph.D., *Assistant Professor of Economics*
Martin Lee Black, Jr. (1930) M.B.A., C.P.A., *Professor of Accounting*
John O. Blackburn (1959) Ph.D., *Professor of Economics*
J. J. Blum (1962) Ph.D., *Professor of Physiology*
Cazlyn Green Bookhout (1935) Ph.D., *Professor of Zoology*
Lloyd J. Borstelmann (1953) Ph.D., *Professor of Medical Psychology*
Nancy Bowers (1965) Ph.D., *Assistant Professor of Anthropology*
Francis Ezra Bowman (1945) Ph.D., *Professor of English*
John S. Boynton (1968) Ph.D., *Assistant Professor of Botany*

¹Absent on sabbatical leave, 1971-72.

²Absent on sabbatical leave, fall semester, 1971-72.

³Retired, August 31, 1971.

⁴Absent on sabbatical leave, spring semester, 1971-72.

⁵Absent on leave, 1971-72.

- William D. Bradford (1965) M.D., *Associate Professor of Pathology*
David G. Bradley (1949) Ph.D., *Professor of Religion*
Charles Kilgo Bradsher (1939) Ph.D., *James B. Duke Professor of Chemistry*
⁶Ralph Braibanti (1953) Ph.D., *James B. Duke Professor of Political Science*
Jack Brehm (1958) Ph.D., *Professor of Psychology*
Mary Lee Brehm (1965) Ph.D., *Assistant Professor of Sociology*
Gert Brieger (1970) Ph.D., *Assistant Professor of History*
Martin Bronfenbrenner (1971) Ph.D., *Professor of Economics*
Earl Ivan Brown, II (1960) Ph.D., *J. A. Jones Professor of Civil Engineering*
⁷Frances Campbell Brown (1931) Ph.D., *Professor of Chemistry*
C. Edward Buckley, III (1960) M.D., *Assistant Professor of Microbiology and Immunology*
Rebecca Buckley (1960) M.D., *Assistant Professor of Immunology*
Louis J. Budd (1952) Ph.D., *Professor of English*
John Buettner-Janusch (1965) Ph.D., *Professor of Anatomy, Professor of Anthropology, and Professor of Zoology*
Donald S. Burdick (1962) Ph.D., *Associate Professor of Mathematics*
Robert Mercer Burger (1962) Ph.D. *Adjunct Associate Professor of Electrical Engineering*
Peter H. Burian (1968) Ph.D., *Assistant Professor of Classics*
R. O. Burns (1964) Ph.D., *Associate Professor of Microbiology*
Richard M. Burton (1970) D.B.A., *Associate Professor of Business Administration*
Gale H. Buzzard (1964) Ph.D., *Assistant Professor of Mechanical Engineering*
Peter F. Carbone (1966) Ed.D., *Associate Professor of Education*
Leonard Carlitz (1932) Ph.D., *James B. Duke Professor of Mathematics*
Dwight W. Carpenter (1966) Ph.D., *Assistant Professor of Physics*
Robert C. Carson (1960) Ph.D., *Professor of Psychology*
Matthew Cartmill (1970) Ph.D., *Assistant Professor of Anatomy and Assistant Professor of Anthropology*
William H. Cartwright (1951) Ph.D., *Professor of Education*
Ernesto Caserta (1971) Ph.D., *Assistant Professor of Romance Languages*
John Cell (1965) Ph.D., *Associate Professor of History*
Jack B. Chaddock (1966) Sc.D., *Professor of Mechanical Engineering*
Roger C. Chapman (1969) Ph.D., *Assistant Professor of Forest Biometry*
James H. Charlesworth (1969) Ph.D., *Assistant Professor of Religion*
⁸Donald B. Chesnut (1965) Ph.D., *Professor of Chemistry*
Edgar W. Clark (1970) Ph.D., *Adjunct Associate Professor of Forest Entomology*
Henry B. Clark (1966) Ph.D., *Associate Professor of Religion*
Howard G. Clark (1968) Ph.D., *Associate Professor of Biomedical and Mechanical Engineering*
⁹Peter Barton Clark (1967) Ph.D., *Assistant Professor of Economics*
Frederic N. Cleaveland (1972) Ph.D., *Professor of Political Science*
Edward Clifford (1968) Ph.D., *Lecturer in Psychology*
Gerald Wayne Clough (1969) Ph.D., *Assistant Professor of Civil Engineering*
¹⁰John Clubbe (1968) Ph.D., *Associate Professor of English*
David Coder (1970) Ph.D., *Assistant Professor of Philosophy*
John D. Coie (1968) Ph.D., *Assistant Professor of Psychology*
Robert Taylor Cole (1935) Ph.D., *James B. Duke Research Professor of Political Science*
Joel Colton (1947) Ph.D., *Professor of History*
Robert Merle Colver (1953) Ed.D., *Associate Professor of Education*
Norman Francis Conant (1935) Ph.D., *James B. Duke Professor of Microbiology*
Robert L. Cook (1963) Ph.D., *Assistant Professor of Physics*
Samuel D. Cook (1966) Ph.D., *Professor of Political Science*
¹¹Thomas Howard Cordle (1950) Ph.D., *Professor of Romance Languages*
Philip Robert Costanzo (1968) Ph.D., *Assistant Professor of Psychology*
John Costlow (1959) Ph.D., *Professor of Zoology*
Sheila J. Counce (1965) Ph.D., *Assistant Professor of Anatomy*

⁶Absent on sabbatical leave, spring semester, 1971-72.

⁷Absent on sabbatical leave, 1971-72.

⁸Absent on sabbatical leave, spring semester, 1971-72.

⁹Absent on leave, 1971-72.

¹⁰Absent on leave, 1971-72.

¹¹Absent on sabbatical leave, spring semester, 1971-72.

- Dario Covi (1970) Ph.D., *Professor of Art*
 J. Christopher Crocker (1966) Ph.D., *Associate Professor of Anthropology*
¹²Elaine Crovitz (1965) Ph.D., *Lecturer in Psychology*
 Herbert F. Crovitz (1963) Ph.D., *Lecturer in Psychology*
 Alvin L. Crumbliss (1970) Ph.D., *Assistant Professor of Chemistry*
 Chicita F. Culberson (1961) Ph.D., *Lecturer in Botany*
 William L. Culberson (1955) Ph.D., *Professor of Botany*
¹³Robert Earle Cushman (1945) B.D., Ph.D., *Professor of Systematic Theology*
 Ron Y. Cusson (1970) Ph.D., *Associate Professor of Physics*
 Jarir Dajani (1971) Ph.D., *Assistant Professor of Civil Engineering*
 William W. Damon (1970) M.B.A., *Assistant Professor of Business Administration*
 David G. Davies (1961) Ph.D., *Professor of Economics*
 William D. Davies (1966) D.D., *Professor of Religion*
 Calvin D. Davis (1962) Ph.D., *Associate Professor of History*
 Gifford Davis (1930) Ph.D., *Professor of Romance Languages*
 J. A. Davis (1967) Ph.D., *Adjunct Professor of Education*
 Lucy Davis (1969) Ed.D., *Adjunct Associate Professor of Education*
 Eugene Davis Day (1962) Ph.D., *Professor of Immunology*
 David C. Dellinger (1968) Ph.D., *Associate Professor of Business Administration*
 Frank C. DeLucia (1969) Ph.D., *Assistant Professor of Physics*
¹⁴Frank Traver de Vyver (1935) Ph.D., *Professor of Economics*
 Irving Diamond (1958) Ph.D., *James B. Duke Professor of Psychology*
 Joseph Di Bona (1967) Ph.D., *Associate Professor of Education*
¹⁵Neal Dow (1934) Ph.D., *Professor of Romance Languages*
 Francis George Dressel (1929) Ph.D., *Professor of Mathematics*
 Bernard Duffey (1960) Ph.D., *Professor of English*
 Kenneth Lindsay Duke (1940) Ph.D., *Associate Professor of Anatomy*
 Robert F. Durden (1952) Ph.D., *Professor of History*
 Jiri Dvorak (1967) C.Sc., Ph.D., *Associate Professor of Civil Engineering*
 Thomas G. Dzubay (1969) Ph.D., *Assistant Professor of Physics*
¹⁶Paul Earls (1959) Ph.D., *Associate Professor of Music*
 Carl Eisdorfer (1956) Ph.D., *Professor of Psychology*
 Jane G. Elchlepp (1956) Ph.D., M.D., *Associate Professor of Pathology*
 Albert Eldridge (1970) Ph.D., *Assistant Professor of Political Science*
 Howard L. Elford (1969) Ph.D., *Assistant Professor of Pharmacology*
 Ernest Elsevier (1950) M.S. in M.E., *Associate Professor of Mechanical Engineering*
 Ainslie Embree (1968) Ph.D., *Professor of History*
 Carl Erickson (1966) Ph.D., *Associate Professor of Psychology*
 Harold Erickson (1970) Ph.D., *Assistant Professor of Anatomy*
 Marilyn Erickson (1968) Ph.D., *Visiting Associate Professor of Education*
 R. P. Erickson (1961) Ph.D., *Associate Professor of Psychology*
 Lawrence Evans (1963) Ph.D., *Associate Professor of Physics*
 John Wendell Everett (1932) Ph.D., *Professor of Anatomy*
 Henry A. Fairbank (1961) Ph.D., *Professor of Physics*
¹⁷John Morton Fein (1950) Ph.D., *Professor of Romance Languages*
 Robert E. Fellows, Jr. (1962) M.D., Ph.D., *Associate Professor of Physiology*
¹⁸Arthur Bowles Ferguson (1939) Ph.D., *Professor of History*
 Oliver Ferguson (1957) Ph.D., *Professor of English*
 Bernard F. Fetter (1951) M.D., *Professor of Pathology*
 Peter G. Fish (1969) Ph.D., *Associate Professor of Political Science*
 Donald J. Fluke (1957) Ph.D., *Professor of Zoology*
 Lloyd R. Fortney (1964) Ph.D., *Associate Professor of Physics*
 Richard B. Forward (1971) Ph.D., *Assistant Professor of Zoology*
 Ludmila A. Foster (1970) Ph.D., *Assistant Professor of Slavic Languages and Literatures*
 John A. Fowler (1953) M.D., *Assistant Professor of Psychiatry*

¹²Absent on sabbatical leave, 1971-72.

¹³Absent on sabbatical leave, 1971-72.

¹⁴Absent on sabbatical leave, spring semester, 1971-72.

¹⁵Retired, August 31, 1971.

¹⁶Absent on sabbatical leave, 1971-72.

¹⁷Absent on sabbatical leave, 1971-72.

¹⁸Absent on sabbatical leave, 1971-72.

- Wallace Fowlie (1964) Ph.D., *James B. Duke Professor of Romance Languages*
- ¹⁹Richard G. Fox (1968) Ph.D., *Associate Professor of Anthropology*
- Charles H. Frenzel (1955) A.B., *Professor of Hospital Administration*
- Irwin Fridovich (1958) Ph.D., *Professor of Biochemistry*
- William J. Furbish (1966) M.S., *Associate Professor of Geology*
- Mercedes Gaffron (1958) M.D., Ph.D., *Associate Research Professor of Psychology*
- Thomas M. Gallie, Jr. (1954-55; 1956) Ph.D., *Professor of Mathematics and Professor of Computer Science*
- Raymond Gavins (1971), Ph.D., *Assistant Professor of History*
- ²⁰Ila Gehman (1959) Ed.D., *Lecturer in Psychology*
- ²¹W. Scott Gehman, Jr. (1954) Ph.D., *Professor of Psychology in Education*
- John T. Gentry (1970) M.D., M.P.H., *Adjunct Professor of Hospital Administration*
- Rhett Truesdale George, Jr. (1957) Ph.D., *Assistant Professor of Electrical Engineering*
- Nicholas W. Gillham (1968) Ph.D., *Associate Professor of Zoology*
- Sherwood Githens (1962) Ph.D., *Professor of Education*
- ²²Clarence Gohdes (1930) Ph.D., *James B. Duke Professor of English*
- ²³Craufurd Goodwin (1962) Ph.D., *Professor of Economics*
- Walter Gordy (1946) Ph.D., LL.D., D.H.C., *James B. Duke Professor of Physics*
- Daniel A. Graham (1969) Ph.D., *Assistant Professor of Economics*
- Pauline Gratz (1969) Ed.D., *Professor of Human Ecology in Nursing*
- Ronald C. Greene (1958) Ph.D., *Associate Professor of Biochemistry*
- Joseph C. Greenfield (1963) M.D., *Assistant Professor of Physiology and Pharmacology*
- John R. Gregg (1957) Ph.D., *Professor of Zoology*
- Eugene Grueling (1948) Ph.D., *Professor of Physics*
- Samson Gross (1960) Ph.D., *Professor of Genetics and Biochemistry*
- Kazimierz Grzybowski (1967) S.J.D., *Professor of Political Science*
- Walter R. Guild (1960) Ph.D., *Professor of Biophysics*
- Robert Burns Gunn (1971) M.D., *Professor of Physiology*
- John Gutnecht (1968) Ph.D., *Assistant Professor of Physiology and Pharmacology*
- William F. Gutknecht (1971) Ph.D., *Assistant Professor of Chemistry*
- Norman Guttman (1951) Ph.D., *Professor of Psychology*
- Robert L. Habig (1968) Ph.D., *Assistant Professor of Biochemistry*
- Donald B. Hackel (1960) M.D., *Professor of Pathology*
- ²⁴Herbert Hacker, Jr. (1965) Ph.D., *Associate Professor of Electrical Engineering*
- William Hagan (1971) Ph.D., *Visiting Professor of Political Science*
- Dwight H. Hall (1968) Ph.D., *Assistant Professor of Biochemistry*
- Hugh Marshall Hall, Jr. (1953) Ph.D., *Professor of Political Science*
- ²⁵Louise Hall (1931) S.B.Arch., Ph.D., *Professor of Architecture*
- William C. Hall (1970) Ph.D., *Assistant Professor of Anatomy and Psychology*
- John Hamilton Hallowell (1942) Ph.D., *Professor of Political Science*
- ²⁶Iain Hamilton (1962) B.Mus., *Mary Duke Biddle Professor of Music*
- William Baskerville Hamilton (1936) Ph.D., *Professor of History*
- William E. Hammond (1963) Ph.D., *Assistant Professor of Biomedical Engineering and Assistant Professor of Computer Science*
- Moo-Young Han (1967) Ph.D., *Associate Professor of Physics*
- ²⁷Philip Handler (1939) Ph.D., *James B. Duke Professor of Biochemistry and Nutrition*
- Frank Allan Hanna (1948) Ph.D., *Professor of Economics*
- Charles Morgan Harman (1961) Ph.D., *Professor of Mechanical Engineering*
- Ellwood Scott Harrar (1936) Ph.D., *James B. Duke Professor of Wood Science*
- Philip D. Harriman (1968) Ph.D., *Assistant Professor of Biochemistry*
- Jerome S. Harris (1936) M.D., *Associate Professor of Biochemistry*
- Robert B. Hartford (1970) Ph.D., *Assistant Professor of Sociology*
- Gerald Hartwig (1971) Ph.D., *Assistant Professor of History*

¹⁹Absent on leave, 1971-72.

²⁰Absent on sabbatical leave, fall semester, 1971-72.

²¹Absent on sabbatical leave, fall semester, 1971-72.

²²Retired, August 31, 1971.

²³Absent on leave, June 1, 1971 through August 31, 1972.

²⁴Absent on sabbatical leave, 1971-72.

²⁵Absent on sabbatical leave, 1971-72.

²⁶Absent on leave, 1971-72.

²⁷Absent on leave, 1971-72.

- William S. Heckscher (1966) Ph.D., *Benjamin N. Duke Professor of Art*
 Thomas M. Havrilesky (1969) Ph.D., *Associate Professor of Economics*
 Henry Hellmers (1965) Ph.D., *Professor of Botany*
 Carl O. Helvie (1969) M.S., *Associate Professor of Nursing*
 Robert William Henkens (1968) Ph.D., *Assistant Professor of Chemistry*
 Stuart C. Henry (1959) Ph.D., *Professor of American Christianity*
 Charles Henson (1967) Ph.D., *Assistant Professor of Mathematics*
 Duncan Heron (1950) Ph.D., *Professor of Geology*
 David Guy Herr (1967) Ph.D., *Assistant Professor of Mathematics*
²⁸Frederick Herzog (1960) B.D., Th.M., Th.D., *Professor of Systematic Theology*
 R. L. Hill (1962) Ph.D., *Professor of Biochemistry*
 Brian A. Hills (1969) Ph.D., *Associate Professor of Experimental Surgery and Biomedical Engineering*
 Frederick R. Hine (1958) M.D., *Associate Professor of Psychology*
 George H. Hitchings (1971) Ph.D., *Professor of Pharmacology*
 Marcus Edwin Hobbs (1935) Ph.D., *Professor of Chemistry*
 Richard Earl Hodel (1965) Ph.D., *Associate Professor of Mathematics*
 Charles S. Hodges, Jr. (1970) Ph.D., *Adjunct Associate Professor of Forest Pathology*
 Irving B. Holley, Jr. (1947) Ph.D., *Professor of History*
 Frederic B. M. Hollyday (1959) Ph.D., *Professor of History*
 Everett H. Hopkins (1961) M.A., LL.D., *Professor of Education*
 Alexander Hull (1962) Ph.D., *Associate Professor of Romance Languages*
 Allan S. Hurlburt (1956) Ph.D., *Professor of Education*
 Mary Huse (1962) Ph.D., *Lecturer in Psychology*
 Miriam Jacobs (1968) Ph.D., *Assistant Professor of Anatomy*
 Wallace Jackson (1965) Ph.D., *Associate Professor of English*
 Peter W. Jeffs (1964) Ph.D., *Professor of Chemistry*
²⁹Bronislas de Leval Jezierski (1958) Ph.D., *Associate Professor of Slavic Languages and Literature*
³⁰Frans F. Jöbsis (1964) Ph.D., *Professor of Physiology*
 Sheridan Johns, III (1970) Ph.D., *Associate Professor of Political Science*
 Charles B. Johnson (1956) Ed.D., *Associate Professor of Education*
 Edward Johnson (1963) M.D., *Professor of Physiology and Pharmacology*
 Kurt Johnson (1971) Ph.D., *Assistant Professor of Anatomy*
 Terry W. Johnson, Jr. (1954) Ph.D., *Professor of Botany*
 William W. Johnston (1971) M.D., *Assistant Professor of Pathology*
 William Thomas Joines (1966) Ph.D., *Associate Professor of Electrical Engineering*
 Wolfgang Karl Joklik (1968) D.Phil., *Professor of Microbiology*
 Buford Jones (1962) Ph.D., *Associate Professor of English*
 Edward Ellsworth Jones (1953) Ph.D., *Professor of Psychology*
 Oliver William Jones (1963) M.D., *Associate Professor of Biochemistry*
 William Kalat (1971) Ph.D., *Assistant Professor of Psychology*
 Arnold D. Kaluzny (1970) Ph.D., *Adjunct Assistant Professor of Hospital Administration*
 Henry Kamin (1948) Ph.D., *Professor of Biochemistry*
 William G. Katzenmeyer (1967) Ed.D., *Associate Professor of Education*
 Bernard Kaufman (1968) Ph.D., *Associate Professor of Biochemistry*
 Thomas F. Keller (1959) Ph.D., *Professor of Business Administration*
 William N. Kelley (1969) M.D., *Assistant Professor of Biochemistry*
 Van Leslie Kenyon, Jr. (1945) M.M.E., *Professor of Mechanical Engineering*
³¹Alan C. Kerckhoff (1958) Ph.D., *Professor of Sociology*
³²Robert B. Kerr (1965) Ph.D., *Professor of Electrical Engineering*
 Sung-Hou Kim (1970) Ph.D., *Assistant Professor of Biochemistry*
 Thomas DeArman Kinney (1970) M.D., *Professor of Pathology*
 Marcel Kinsbourne (1967) M.D., *Lecturer in Psychology*
 Gary Kirk (1970) Ph.D., *Assistant Professor of Physiology*
 Warren Kirkendale (1967) Dr.Phil., *Associate Professor of Musicology*

²⁸Absent on sabbatical leave, 1971-72.

²⁹Absent on sabbatical leave, fall semester, 1971-72.

³⁰Absent on sabbatical leave, September 1, 1971 through May 31, 1972.

³¹Absent on sabbatical leave, 1971-72.

³²Absent on sabbatical leave, 1971-72.

- ³³Norman Kirshner (1956) Ph.D., *Associate Professor of Biochemistry*
 Joseph Weston Kitchen, Jr. (1962) Ph.D., *Associate Professor of Mathematics*
 Gordon K. Klintworth (1964) Ph.D., M.D., *Associate Professor of Pathology*
 Peter H. Klopfer (1958) Ph.D., *Professor of Zoology*
 K. R. Knoerr (1961) Ph.D., *Associate Professor of Forest Meteorology in Forestry and Associate Professor of Biometeorology in Botany*
- ³⁴Allan Kornberg (1965) Ph.D., *Professor of Political Science*
- ³⁵Wesley A. Kort (1965) Ph.D., *Associate Professor of Religion*
 Carlos Kozma (1970) M.D., *Adjunct Associate Professor of Pathology*
 David Paul Kraines (1970) Ph.D., *Assistant Professor of Mathematics*
 Paul Jackson Kramer (1931) Ph.D., *James B. Duke Professor of Botany*
 Richard B. Kramer (1968) Ph.D., *Assistant Professor of Psychology*
 Nicholas Michael Kredich (1968) M.D., *Assistant Professor of Biochemistry*
 Irwin Kremen (1963) Ph.D., *Assistant Professor of Psychology*
 Juanita M. Kreps (1955) Ph.D., *Professor of Economics*
 William R. Krigbaum (1952) Ph.D., *James B. Duke Professor of Chemistry*
 Robert Krueger (1961) D.Phil., *Associate Professor of English*
 Arnold D. Krugman (1964) Ph.D., *Lecturer in Psychology*
 Magnus Jan Krynski (1966) Ph.D., *Associate Professor of Slavic Languages and Literatures*
 Wladyslaw W. Kulski (1963) Dr.Jur., *James B. Duke Professor of Russian Affairs*
 Johannes A. Kylstra (1958) M.D., Ph.D., *Assistant Professor of Physiology*
 Weston La Barre (1946) Ph.D., *Professor of Anthropology*
 Leon Lack (1965) Ph.D., *Professor of Physiology and Pharmacology*
 Creighton Lacy (1953) B.D., Ph.D., *Professor of Missions and Social Ethics*
 Martin Lakin (1958) Ph.D., *Professor of Psychology and Professor of Medical Psychology*
 Karla Langedijk (1971) Ph.D., *Lecturer in Art History*
 Thomas Langford (1956) Ph.D., *Professor of Religion*
 John Tate Lanning (1927) Ph.D., *James B. Duke Professor of History*
 John E. Larsh, Jr. (1943) Sc.D., *Professor of Parasitology in Microbiology and Immunology*
 Peter K. Lauf (1968) M.D., *Assistant Professor of Physiology*
 Richard H. Leach (1955) Ph.D., *Professor of Political Science*
 Jack A. Lees (1971) Ph.D., *Assistant Professor of Mathematics*
 Warren Lerner (1961) Ph.D., *Associate Professor of History*
 Harold Walter Lewis (1949) Ph.D., *Professor of Physics*
 Melvyn Lieberman (1967) Ph.D., *Assistant Professor of Physiology and Pharmacology*
 John L. Lievsay (1962) Ph.D., *James B. Duke Professor of English*
- ³⁶Darwyn E. Linder (1965) Ph.D., *Associate Professor of Psychology*
- ³⁷L. Sigfred Linderoth, Jr. (1965) M.E., *Professor of Mechanical Engineering*
 Daniel A. Livingstone (1956) Ph.D., *Professor of Zoology*
 Charles H. Lochmüller (1969) Ph.D., *Assistant Professor of Chemistry*
- ³⁸Gregory Lockhead (1965) Ph.D., *Associate Professor of Psychology*
- ³⁹E. Croft Long (1956) M.D., *Associate Professor of Physiology and Pharmacology*
 William Longley (1968) Ph.D., *Assistant Professor of Anatomy*
 Ronald Luftig (1969) Ph.D., *Assistant Professor of Microbiology*
 John G. Lundberg (1970) Ph.D., *Assistant Professor of Zoology*
 William S. Lynn, Jr. (1954) M.D., *Associate Professor of Biochemistry*
- ⁴⁰George W. Lynts (1965) Ph.D., *Associate Professor of Geology*
 Barry MacKichan (1970) Ph.D., *Assistant Professor of Mathematics*
 K. S. McCarty (1950) Ph.D., *Professor of Biochemistry*
 Marjorie McElroy (1971) Ph.D., *Assistant Professor of Economics*
 P. A. McKee (1971) M.D., *Assistant Professor of Biochemistry*
 John C. McKinney (1957) Ph.D., *Professor of Sociology*
 Thomas J. McManus (1961) M.D., *Associate Professor of Physiology*
 Andrew T. McPhail (1968) Ph.D., *Associate Professor of Chemistry*

³³Absent on sabbatical leave, 1971-72.

³⁴Absent on leave, 1971-72.

³⁵Absent on sabbatical leave, spring semester, 1971-72.

³⁶Absent on sabbatical leave, 1971-72.

³⁷Absent on sabbatical leave, fall semester, 1971-72.

³⁸Absent on sabbatical leave, 1971-72.

³⁹Absent on leave, September 1, 1971 through August 31, 1973.

⁴⁰Absent on sabbatical leave, spring semester, 1971-72.

- ⁴¹John Nelson Macduff (1956) M.M.E., *Professor of Mechanical Engineering*
 Ian MacIntyre (1971) Ph.D., *Adjunct Assistant Professor of Geology*
 Steven Maier (1971) Ph.D., *Assistant Professor of Business Administration*
 George L. Maddox (1960) Ph.D., *Professor of Sociology*
 Moses S. Mahaley (1965) Ph.D., *Assistant Professor of Anatomy*
 Edward P. Mahoney (1965) Ph.D., *Associate Professor of Philosophy*
 Mark Mantuani (1971) Ph.D., *Visiting Assistant Professor of Geology*
 Peter N. Marinos (1968) Ph.D., *Associate Professor of Electrical Engineering*
 Sidney David Markman (1947) Ph.D., *Professor of Art History and Archaeology*
 David V. Martin (1962) Ed.D., *Associate Professor of Education*
 William Maxwell Mason (1970) Ph.D., *Assistant Professor of Sociology*
- ⁴²Seymour Mauskopf (1964) Ph.D., *Assistant Professor of History*
 Robert Arthur Maxwell (1971) Ph.D., *Professor of Physiology*
 Otto Meier, Jr. (1934) Ph.D., *Professor of Electrical Engineering*
- ⁴³Elgin W. Mellow, Jr. (1965) Ph.D., *Associate Professor of English*
 Lorne Mendell (1968) Ph.D., *Assistant Professor of Physiology*
- ⁴⁴James Lathrop Meriam (1963) Ph.D., *Professor of Engineering Mechanics*
 Louis John Metz (1970) Ph.D., *Adjunct Associate Professor of Forest Soils*
- ⁴⁵Richard S. Metzgar (1962) Ph.D., *Associate Professor of Immunology*
 Johannes Horst Max Meyer (1959) D.Sc., *Professor of Physics*
 Eric Meyers (1969) Ph.D., *Associate Professor of Religion*
 Martin Miller (1970) Ph.D., *Assistant Professor of History*
 Elliott Mills (1968) Ph.D., *Assistant Professor of Physiology*
 Gerald Monsman (1965) Ph.D., *Associate Professor of English*
 John W. Moore (1961) Ph.D., *Professor of Physiology*
 Lawrence C. Moore, Jr. (1966) Ph.D., *Assistant Professor of Mathematics*
 Montrose J. Moses (1959) Ph.D., *Professor of Anatomy*
 Bruce J. Muga (1967) Ph.D., *Associate Professor of Civil Engineering*
 Bruce Roy Munson (1970) Ph.D., *Assistant Professor of Mechanical Engineering*
 Arvin W. Murch (1969) Ph.D., *Assistant Professor of Sociology*
 Roland E. Murphy (1967) S.T.D., *Professor of Religion*
 Francis Joseph Murray (1960) Ph.D., *Professor of Mathematics*
 James J. Murray (1967) M.S., *Adjunct Associate Professor of Mechanical Engineering*
 George C. Myers (1968) Ph.D., *Professor of Sociology*
 Toshio Narahashi (1965) Ph.D., *Professor of Pharmacology*
 Sydney Nathans (1966) Ph.D., *Assistant Professor of History*
 Aubrey Willard Naylor (1952) Ph.D., *Professor of Botany*
- ⁴⁶Thomas H. Naylor (1964) Ph.D., *Professor of Economics*
 Glenn Robert Negley (1946) Ph.D., *Professor of Philosophy*
 Henry Winston Newson (1948) Ph.D., *James B. Duke Professor of Physics*
- ⁴⁷Francis Newton (1967) Ph.D., *Professor of Latin in Classical Studies*
 Charles Adam Nichol (1971) Ph.D., *Professor of Pharmacology*
 Jack L. Nichols (1970) Ph.D., *Assistant Professor of Microbiology*
 Robert Bruce Nicklas (1965) Ph.D., *Professor of Zoology*
 Robert Niess (1971) Ph.D., *Visiting Professor of Romance Languages*
 Charles Edwin V. Nixon (1971) Ph.D., *Assistant Professor of Classical Studies*
 Loren Nolte (1966) Ph.D., *Associate Professor of Electrical Engineering and Associate Professor of Biomedical Engineering*
 Richey Novak (1970) Ph.D., *Assistant Professor of Germanic Languages and Literatures*
 Holger O. Nygard (1960) Ph.D., *Professor of English*
 John F. Oates (1967) Ph.D., *Professor of Ancient History in Classical Studies*
 William O'Barr (1969) Ph.D., *Assistant Professor of Anthropology*
 Walter D. Obrist (1956) Ph.D., *Lecturer in Psychology*
 William M. O'Fallon (1965) Ph.D., *Assistant Professor of Mathematics*
 Samuel R. Oleinick (1969) Ph.D., *Assistant Professor of Immunology*

⁴¹Absent on sabbatical leave, spring semester, 1971-72.

⁴²Absent on sabbatical leave, fall semester, 1971-72.

⁴³Absent on sabbatical leave, spring semester, 1971-72.

⁴⁴Absent on leave, spring semester, 1971-72.

⁴⁵Absent on sabbatical leave, October 1, 1971 through March 31, 1972.

⁴⁶Absent on sabbatical leave, fall semester, 1971-72.

⁴⁷Absent on sabbatical leave, 1971-72.

- Robert T. Osborn (1954) B.D., Ph.D., *Professor of Religion*
 Suydam Osterhout (1959) M.D., Ph.D., *Associate Professor of Microbiology*
 Athos Ottolenghi (1959) M.D., *Associate Professor of Physiology and Pharmacology*
 Harry Ashton Owen, Jr. (1951) Ph.D., *Professor of Electrical Engineering*
 George M. Padilla (1965) Ph.D., *Associate Professor of Physiology*
 David L. Paletz (1970) Ph.D., *Assistant Professor of Political Science*
 Aubrey E. Palmer (1944) C.E., *Associate Professor of Civil Engineering*
 Keith H. Palmer (1969) Ph.D., *Clinical Assistant Professor of Pharmacology*
 Richard A. Palmer (1966) Ph.D., *Associate Professor of Chemistry*
 Erdman B. Palmore (1967) Ph.D., *Associate Professor of Sociology*
 William E. Parham (1972) Ph.D., *R. J. Reynolds Professor of Chemistry*
 Harold Talbot Parker (1939) Ph.D., *Professor of History*
 Harry Partin (1964) Ph.D., *Associate Professor of Religion*
 Joel Francis Paschal (1954) Ph.D., *Professor of Law*
 Merrill Lee Patrick (1964) Ph.D., *Associate Professor of Mathematics and Associate Professor of Computer Science*
- ⁴⁸Ransom Rathbone Patrick (1954) M.F.A., Ph.D., *Professor of Aesthetics and Art*
 Lewis Patton (1926) Ph.D., *Professor of English*
 Michael I. Pavlov (1960) Ph.D., *Assistant Professor of Russian Language*
 William Bernard Peach (1951) Ph.D., *Professor of Philosophy*
 George Wilbur Pearsall (1964) Sc.D., *Professor of Mechanical Engineering*
 Talmage Lee Peele (1939) M.D., *Professor of Anatomy and Lecturer in Psychology*
 Ronald D. Perkins (1968) Ph.D., *Associate Professor of Geology*
 Anton Peterlin (1962) Ph.D., *Adjunct Professor of Chemistry*
 Russell J. Petersen (1971) Ph.D., *Assistant Professor of Business Administration*
 Ray C. Petry (1937) Ph.D., LL.D., *James B. Duke Professor of Church History*
 Olan Lee Petty (1952) Ph.D., *Professor of Education*
 Leland R. Phelps (1961) Ph.D., *Professor of German*
 Jane Philpott (1951) Ph.D., *Professor of Botany*
- ⁴⁹Orrin Pilkey (1965) Ph.D., *Associate Professor of Geology*
 Theo Clyde Pilkington (1958) Ph.D., *Professor of Electrical Engineering and Biomedical Engineering*
 Colin G. Pitt (1969) Ph.D., *Adjunct Associate Professor of Chemistry*
 Robert A. Pittillo, Jr. (1968) Ed.D., *Associate Professor of Education*
 Jacques C. Poirier (1955) Ph.D., *Professor of Chemistry*
 Louis Pondy (1967) Ph.D., *Associate Professor of Business Administration and Assistant Professor of Sociology*
 Ned Allen Porter (1969) Ph.D., *Assistant Professor of Chemistry*
 Herbert S. Posner (1968) Ph.D., *Clinical Associate Professor of Pharmacology*
 W. H. Poteat (1960) B.D., Ph.D., *Professor of Christianity and Culture*
 Benjamin Edward Powell (1946) Ph.D., *Librarian*
 Philip Pratt (1971) M.D., *Professor of Pathology*
 Richard Lionel Predmore (1950) D.M.L., *Professor of Romance Languages*
 Jack J. Preiss (1959) Ph.D., *Professor of Sociology*
- ⁵⁰Richard A. Preston (1961) Ph.D., *William K. Boyd Professor of History*
 James Ligon Price, Jr. (1952) Ph.D., *Professor of Religion*
 Louis DuBose Quin (1956) Ph.D., *Professor of Chemistry*
 K. V. Rajagopalan (1966) Ph.D., *Associate Professor of Biochemistry*
 Charles William Ralston (1953) Ph.D., *Professor of Forest Soils*
 Dietolf Ramm (1969) Ph.D., *Assistant Professor of Computer Science*
 Dale B. J. Randall (1957) Ph.D., *Professor of English*
 Norman B. Ratliff (1971) M.D., *Associate Professor of Pathology*
 John Reckless (1968) M.D., *Associate Professor of Psychiatry*
 Michael Kay Reedy (1969) M.D., *Associate Professor of Anatomy*
 Edmund Reiss (1967) Ph.D., *Professor of English*
- ⁵¹Eugene M. Renkin (1963) Ph.D., *Professor of Physiology*
 Jacqueline A. Reynolds (1969) Ph.D., *Associate Professor of Biochemistry*
 David Claude Richardson (1969) Ph.D., *Assistant Professor of Biochemistry*

⁴⁸Deceased, April 27, 1971.

⁴⁹Absent on sabbatical leave, 1971-72.

⁵⁰Absent on sabbatical leave, 1971-72.

⁵¹Absent on sabbatical leave January 15, 1972 to July 15, 1972.

- Lawrence Richardson, Jr. (1966) Ph.D., *Professor of Latin in Classical Studies*
 Eberhard Karl Riedel (1971) Ph.D., *Assistant Professor of Physics*
 Kent J. Rigsby (1971) M.A. and Harvard Society of Fellows, *Assistant Professor of Classics*
 Russell Roberson (1963) Ph.D., *Associate Professor of Physics*
 George W. Roberts (1971) Ph.D., *Associate Professor of Philosophy*
⁵²John Henderson Roberts (1931) Ph.D., *Professor of Mathematics*
 J. David Robertson (1966) Ph.D., *Professor of Anatomy*
 Charles K. Robinson (1961) Ph.D., *Associate Professor of Religion*
 Hugh G. Robinson (1964) Ph.D., *Professor of Physics*
 Hermann R. Robl (1959-64; 1966) Ph.D., *Adjunct Professor of Physics*
 Theodore Ropp (1938) Ph.D., *Professor of History*
 Carl M. Rose, Jr. (1967) Ph.D., *Assistant Professor of Physics*
 David Rosenthal (1969) Ph.D., *Adjunct Associate Professor of Chemistry*
 Wendell F. Rosse (1968) M.D., *Associate Professor of Immunology*
 Donald Francis Roy (1950) Ph.D., *Professor of Sociology*
 Ralph Wayne Rundles (1945) Ph.D., M.D., *Professor of Microbiology*
 Harvey J. Sage (1964) Ph.D., *Associate Professor of Biochemistry and Assistant Professor of Pathology*
 Herman Salinger (1955) Ph.D., *Professor of German*
 Jay S. Salkin (1969) Ph.D., *Assistant Professor of Economics*
 John V. Salzano (1956) Ph.D., *Associate Professor of Physiology*
⁵³Charles Richard Sanders (1937) Ph.D., *Professor of English*
 David H. Sanford (1970) Ph.D., *Associate Professor of Philosophy*
 Lloyd Saville (1946) Ph.D., *Professor of Economics*
 Saul M. Schanberg (1967) Ph.D., M.D., *Associate Professor of Pharmacology*
 Harold Schiffman (1963) Ph.D., *Professor of Psychology*
 Klaus Schmidt-Koenig (1971) Ph.D., *Adjunct Associate Professor of Zoology*
 Knut Schmidt-Nielsen (1952) Mag. Sc., Dr.Phil., *James B. Duke Professor of Physiology in the Department of Zoology*
 Ernest Schoffeniels (1969) M.D., *Visiting Professor of Physiology and Pharmacology*
 David W. Schomberg (1968) Ph.D., *Assistant Professor of Physiology*
 James M. Schooler, Jr. (1970) Ph.D., *Assistant Professor of Physiology*
 Kenneth J. Schoonhagen (1966) M.H.A., *Instructor of Hospital Administration*
 Anne Firor Scott (1961) Ph.D., *Professor of History*
 David W. Scott (1971) Ph.D., *Assistant Professor of Immunology*
 William E. Scott (1958) Ph.D., *Professor of History*
 Richard A. Scoville (1961) Ph.D., *Assistant Professor of Mathematics*
 Richard B. Searles (1965) Ph.D., *Associate Professor of Botany*
 H. F. Seigler (1967) M.D., *Associate Professor of Immunology*
 Walter E. Sewell (1965) Ph.D., *Adjunct Professor of Mathematics*
 James Shafland (1969) Ph.D., *Assistant Professor of Anatomy*
 Marion L. Shepard (1967) Ph.D., *Associate Professor of Mechanical Engineering*
 Joseph R. Shoenfield (1952) Ph.D., *Professor of Mathematics*
 William Derek Shows (1967) Ph.D., *Assistant Professor of Medical Psychology*
 R. Baird Shuman (1962) Ph.D., *Professor of Education*
 Lewis M. Siegel (1966) Ph.D., *Assistant Professor of Biochemistry*
 Bernard Silberman (1967) Ph.D., *Professor of History*
 Ida Simpson (1967) Ph.D., *Associate Professor of Sociology*
 William H. Simpson (1930) Ph.D., *Professor of Political Science*
 Theodore Alan Slotkin (1971), *Assistant Professor of Physiology*
 D. Moody Smith (1965) Ph.D., *Professor of Religion*
 David A. Smith (1962) Ph.D., *Associate Professor of Mathematics*
 Donald S. Smith, II (1961) M.H.A., *Assistant Professor of Hospital Administration*
 Grover C. Smith (1952) Ph.D., *Professor of English*
 Harmon Smith (1962) Ph.D., *Associate Professor of Moral Theology*
 Joel Smith (1958) Ph.D., *Professor of Sociology*
 Peter Smith (1959) Ph.D., *Professor of Chemistry*
 Ralph Smith (1970) Ph.D., *Assistant Professor of Microbiology*
 George G. Somjen (1963) M.D., *Professor of Physiology and Lecturer in Psychology*
 Joachim R. Sommer (1957) M.D., *Professor of Pathology*

⁵²Retired, August 31, 1971.

⁵³Absent on sabbatical leave, 1972-73.

- Joseph John Spengler (1934) Ph.D., *James B. Duke Professor of Economics*
George Spooner (1971) Ph.D., *Assistant Professor of Pathology*
Thomas Arthur Spragens, Jr. (1967) Ph.D., *Assistant Professor of Political Science*
Olaf Stackelberg (1963) Ph.D., *Associate Professor of Mathematics*
J. E. R. Staddon (1967) Ph.D., *Associate Professor of Psychology*
W. J. Stambaugh (1961) Ph.D., *Associate Professor of Forestry*
Dennis Keith Stanley (1961) Ph.D., *Associate Professor of Classical Studies*
Charles Franklin Starmer, Jr. (1966) Ph.D., *Associate Professor of Computer Science*
David Curtis Steinmetz (1971) Th.D., *Associate Professor of Religion*
Henry R. Stern (1968) Ph.D., *Assistant Professor of German*
Lionel Stevenson (1955) B.Litt. (Oxon), Ph.D., F.R.S.L., *James B. Duke Professor of English*
- ⁵⁴William Franklin Stinespring (1936) Ph.D., *Professor of Old Testament and Semitics*
⁵⁵Donald E. Stone (1963) Ph.D., *Professor of Botany*
Virginia Stone (1966) Ph.D., *Professor of Nursing*
Boyd R. Strain (1969) Ph.D., *Associate Professor of Botany*
Victor H. Strandberg (1966) Ph.D., *Associate Professor of English*
⁵⁶Howard Austin Strobel (1948) Ph.D., *Professor of Chemistry*
⁵⁷Henry L. Sublett, Jr. (1962) Ed.D., *Associate Professor of Education*
J. Bolling Sullivan (1970) Ph.D., *Assistant Professor of Biochemistry*
⁵⁸Elizabeth Read Sunderland (1939-42; 1943) Ph.D., *Professor of Art*
John Sutherland (1969) Ph.D., *Assistant Professor of Zoology*
Louis E. Swanson (1949) A.B., *Associate Professor of Hospital Administration*
John Sykes (1968) Ph.D., *Assistant Professor of Physics*
Charles Tanford (1959) Ph.D., *Professor of Biochemistry*
John J. TePaske (1967) Ph.D., *Professor of History*
Marcel Tétel (1960) Ph.D., *Professor of Romance Languages*
Frances J. Thomas (1970) Ph.D., *Assistant Professor of Nursing*
Larry W. Thompson (1961) Ph.D., *Lecturer in Psychology*
Fredrick L. Thurstone (1967) Ph.D., *Professor of Electrical Engineering and Professor of Biomedical Engineering*
- ⁵⁹Edward A. Tiryakian (1965) Ph.D., *Professor of Sociology*
Craig Tisher (1971) M.D., *Assistant Professor of Pathology*
Daniel C. Tosteson (1961) M.D., *James B. Duke Professor of Physiology*
V. G. Trembl (1967) Ph.D., *Associate Professor of Economics*
Philip H. Trickey (1965) M.S.E.E., *Visiting Professor of Electrical Engineering*
Richard Trilling (1970) Ph.D., *Assistant Professor of Political Science*
James Nardin Truesdale (1930) Ph.D., *Professor of Greek*
⁶⁰Vance Tucker (1964) Ph.D., *Associate Professor of Zoology*
Roger W. Turkington (1968) M.D., *Assistant Professor of Biochemistry*
Arlin Turner (1953) Ph.D., *Professor of English*
Richard L. Tuthill (1953) Ed.D., *Professor of Geography*
Senol Utku (1970) Sc.D., *Associate Professor of Civil Engineering*
Thomas C. Vanaman (1970) Ph.D., *Assistant Professor of Microbiology*
John M. Vernon (1966) Ph.D., *Associate Professor of Economics*
- ⁶¹Aleksandar Sedmak Vesic (1964) D.Sc., *J. A. Jones Professor of Civil Engineering*
P. Aarne Vesilind (1970) Ph.D., *Assistant Professor of Civil Engineering*
Elia E. Villanueva (1961) M.A., *Assistant Professor of Physical Therapy*
Patrick R. Vincent (1954) Ph.D., *Associate Professor of Romance Languages*
F. Stephen Vogel (1961) M.D., *Professor of Pathology*
Steven Vogel (1966) Ph.D., *Associate Professor of Zoology*
Louis D. Volpp (1967) Ph.D., *Professor of Business Administration*
Fred M. Vukovich (1967) Ph.D., *Adjunct Associate Professor of Forest Meteorology*
Howard C. Wachtel (1968) Ph.D., *Associate Professor of Biomedical Engineering and Assistant Professor of Physiology*

⁵⁴Retired, August 31, 1971.

⁵⁵Absent on sabbatical leave, 1971-72.

⁵⁶Absent on sabbatical leave, 1971-72.

⁵⁷Absent on sabbatical leave, fall semester, 1971-72.

⁵⁸Absent on leave, 1971-72.

⁵⁹Absent on sabbatical leave, 1971-72.

⁶⁰Absent on sabbatical leave, 1971-72.

⁶¹Absent on sabbatical leave, spring semester, 1971-72.

- Stephen A. Wainwright (1964) Ph.D., *Associate Professor of Zoology*
 William D. Walker (1971) Ph.D., *Professor of Physics*
 Michael Wallach (1962) Ph.D., *Professor of Psychology*
 Richard L. Walter (1962) Ph.D., *Associate Professor of Physics*
 Paul P. Wang (1968) Ph.D., *Associate Professor of Electrical Engineering*
 Calvin L. Ward (1952) Ph.D., *Associate Professor of Zoology*
 Frances Ellen Ward (1969) Ph.D., *Assistant Professor of Immunology*
 Bruce W. Wardropper (1962) Ph.D., *William Hanes Wannamaker Professor of Romance Languages*
 Seth L. Warner (1955) Ph.D., *Professor of Mathematics*
⁶²Richard Lyness Watson, Jr. (1939) Ph.D., *Professor of History*
 Katharine Way (1968) Ph.D., *Adjunct Professor of Physics*
 Robert E. Webster (1970) Ph.D., *Associate Professor of Biochemistry*
 Eliot Weintraub (1970) Ph.D., *Assistant Professor of Economics*
 Morris Weisfeld (1967) Ph.D., *Professor of Mathematics*
 Henry Weitz (1950) Ed.D., *Professor of Education*
 Bruce A. Wells (1964) M.S.E.E., *Associate Professor of Electrical Engineering*
 Richard L. Wells (1962) Ph.D., *Associate Professor of Chemistry*
 Paul Welsh (1948) Ph.D., *Professor of Philosophy*
 Robert W. Wheat (1956) Ph.D., *Associate Professor of Microbiology and Assistant Professor of Biochemistry*
 Charles W. White (1970) Ph.D., *Assistant Professor of Psychology*
 Richard A. White (1963) Ph.D., *Associate Professor of Botany*
 Willamay Whitner (1969) *Associate Professor in Nursing*
 Karl Milton Wilbur (1946) Ph.D., *James B. Duke Professor of Zoology*
 Robert L. Wilbur (1957) Ph.D., *Professor of Botany*
 Pelham Wilder, Jr. (1949) Ph.D., *Professor of Chemistry*
 William E. Wilkinson (1967) Ph.D., *Assistant Professor of Mathematics*
 Hilda Pope Willett (1948) Ph.D., *Professor of Bacteriology*
 George W. Williams (1957) Ph.D., *Professor of English*
 Leland Williams (1970) Ph.D., *Adjunct Associate Professor of Computer Science*
 William Hailey Willis (1963) Ph.D., *Professor of Greek in Classical Studies*
 James F. Wilson (1967) Ph.D., *Associate Professor of Civil Engineering*
 James W. Wilson (1967) Ph.D., *Assistant Professor of Pathology*
 John Wilson (1968) Ph.D., *Associate Professor of Sociology*
 Ruby Leila Wilson (1971) Ed.D., *Professor of Nursing*
 Thomas George Wilson (1959) Sc.D., *Professor of Electrical Engineering*
 Cliff W. Wing, Jr. (1965) Ph.D., *Associate Professor of Psychology*
 Orval S. Wintermute (1958) Ph.D., *Associate Professor of Religion*
 Ronald Witt (1971) Ph.D., *Assistant Professor of History*
 Benjamin Wittels (1961) M.D., *Professor of Pathology*
 Myron Wolbarsht (1969) Ph.D., *Associate Professor of Physiology and Lecturer in Biomedical Engineering*
 Max A. Woodbury (1966) Ph.D., *Professor of Mathematics and Professor of Computer Science*
 Paul Wortman (1967) Ph.D., *Assistant Professor of Psychology*
 Donald Wright (1967) Ph.D., *Assistant Professor of Mechanical Engineering*
 James E. Wuenschel (1970) Ph.D., *Assistant Professor of Forestry*
 David O. Yandle (1967) Ph.D., *Associate Professor of Forest Mathematics*
 William P. Yohe (1958) Ph.D., *Professor of Economics*
 Charles R. Young (1954) Ph.D., *Professor of History*
 Franklin W. Young (1944-50; 1968) Ph.D., *Amos Ragan Kearns Professor of New Testament and Patristic Studies in Religion*
 Hans Zweerink (1970) Ph.D., *Assistant Professor of Microbiology*

Emeritus Professors

- ⁶³Donald Keith Adams (1931) Ph.D., *Professor Emeritus of Psychology*
 Katharine May Banham (1946) Ph.D., *Professor Emeritus of Psychology*
 Charles A. Baylis (1952) Ph.D., *Professor Emeritus of Philosophy*

⁶²Absent on sabbatical leave, fall semester, 1971-72.

⁶³Deceased, May 20, 1971.

- Lucius Aurelius Bigelow (1929) Ph.D., *Professor Emeritus of Chemistry*
Edward Claude Bolmeier (1948) Ph.D., *Professor Emeritus of Education*
Benjamin Boyce (1950) Ph.D., *James B. Duke Professor Emeritus of English*
Benjamin Guy Childs (1924) M.A., *Professor Emeritus of Education*
Kenneth Willis Clark (1931) Ph.D., D.D., *Professor Emeritus of New Testament*
Frederick A. G. Cowper (1918) Ph.D., *Professor Emeritus of Romance Languages*
John S. Curtiss (1945) Ph.D., *James B. Duke Professor Emeritus of History*
Bingham Dai (1943) Ph.D., *Professor Emeritus of Psychology*
George Sharp Eadie (1930) Ph.D., *Professor Emeritus of Physiology and Pharmacology*
Howard Easley (1930) Ph.D., *Associate Professor Emeritus of Education*
William Whitfield Elliott (1925) Ph.D., *Professor Emeritus of Mathematics*
Allan H. Gilbert (1920) Ph.D., *Professor Emeritus of English*
Irving Emery Gray (1930) Ph.D., *Professor Emeritus of Zoology*
Paul M. Gross (1919) Ph.D., *William Howell Pegram Professor Emeritus of Chemistry*
George Thomas Hargitt (1930) Ph.D., Sc.D., *Professor Emeritus of Zoology*
Charles Cleveland Hatley (1917) Ph.D., *Professor Emeritus of Physics*
Duncan Charteris Hetherington (1930) Ph.D., M.D., *Professor Emeritus of Anatomy*
Calvin Bryce Hoover (1925) Ph.D., *James B. Duke Professor Emeritus of Economics*
Jay Broadus Hubbell (1927) Ph.D., *Professor Emeritus of English*
Wanda S. Hunter (1947) Ph.D., *Professor Emeritus of Zoology*
William H. Irving (1936) B.A. (Oxon) Ph.D., *Professor Emeritus of English*
Brady Rimbey Jordan (1927) Ph.D., *Professor Emeritus of Romance Languages*
Helen L. Kaiser (1943) R.P.T., *Professor Emeritus of Physical Therapy*
William Thomas Laprade (1909) Ph.D., *Professor Emeritus of History*
Charles Earl Landon (1926) Ph.D., *Professor Emeritus of Economics*
Alan Krebs Manchester (1929) Ph.D., *Professor Emeritus of History*
Ernest William Nelson (1926) Ph.D., *Professor Emeritus of History*
Walter McKinley Nielsen (1925) Ph.D., *James B. Duke Professor Emeritus of Physics*
James G. Osborne (1961) B.S., *Professor Emeritus of Forestry*
Robert Leet Patterson (1945) Ph.D., *Professor Emeritus of Philosophy*
Harold Sanford Perry (1932) Ph.D., *Professor Emeritus of Botany*
Robert Stanley Rankin (1927) Ph.D., *Professor Emeritus of Political Science*
Mabel F. Rudisill (1948) Ph.D., *Professor Emeritus of Education*
David Tillerson Smith (1930) M.D., Litt.D., *James B. Duke Professor Emeritus of Microbiology*
H. Shelton Smith (1931) Ph.D., *James B. Duke Professor Emeritus of Religion*
Hersey Everett Spence (1918) *Professor Emeritus of Religious Education*
W. A. Stumpf (1948) Ph.D., *Professor Emeritus of Education*
Edgar Tristram Thompson (1935) Ph.D., *Professor Emeritus of Sociology*
Clement Vollmer (1926) Ph.D., *Professor Emeritus of German*
Warren Chase Vosburgh (1928) Ph.D., *Professor Emeritus of Chemistry*
Loring Baker Walton (1929) Lic. es L., Ph.D., *Professor Emeritus of Romance Languages*
Charles Eugene Ward (1927) Ph.D., *Professor Emeritus of English*
⁶⁴James Wesley Williams (1937) M.S., *Professor Emeritus of Civil Engineering*
Robert Renbert Wilson (1925) Ph.D., LL.D., *James B. Duke Professor Emeritus of Political Science*
Frederick Adolphus Wolf (1927) Ph.D., *James B. Duke Professor Emeritus of Botany*
Robert Hilliard Woody (1929) Ph.D., *Professor of History*

⁶⁴Deceased, August 15, 1971.



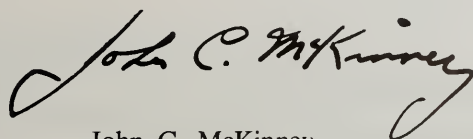
To the Prospective Graduate Student at Duke University.

Several years ago a committee of distinguished scholars was appointed and asked to appraise the state of graduate education at Duke University and indicate guidelines for its future development. I would like to quote briefly from the preamble of their report:

The primary role of a university is to provide a focus for the growth of ideas. Since ideas grow in the minds of men, communication between scholars, between faculty and students—in short, teaching—is the first basic function of a university. But without great ideas to communicate—ideas old and new, traditional and nascent—teaching is an exercise of futility. Therefore, the second basic function of a university must be research, characterized by the spirit of free inquiry and the exploration, analysis, and synthesis of ideas. These two faces of a university are complementary.

Even in the undergraduate college or in the professional school, the student learns best when moved by a spirit indistinguishable from the mood of the scholar engaged in original research. The ideas taught are, in fact, new to the student and therefore fit material for his “original” research. But it is in the graduate school that teaching and research become truly inseparable.

To the student in search of a superior graduate education Duke University has much to offer: excellent research facilities such as an outstanding library, a major computing center, modern laboratories—but above all, a highly productive graduate faculty dedicated to the twin functions of teaching and research. The following pages, and the information they contain, are addressed to the student seeking a soundly based graduate education.

A handwritten signature in dark ink, reading "John C. McKinney". The signature is fluid and cursive, with a large, sweeping initial "J" and a long, trailing flourish at the end.

John C. McKinney
Dean of the Graduate School



1

Program Information

Degrees Offered

The Graduate School of Duke University now offers the following degrees: Master of Arts (A.M.), Master of Science (M.S.), Master of Education (M.Ed.), Master of Arts in Teaching (M.A.T.), Master of Hospital Administration (M.H.A.), Master of Business Administration (M.B.A.), Doctor of Philosophy (Ph.D.), and Doctor of Education (Ed.D.).

The Master's Degrees

To be considered as a candidate for a master's degree (A.M., M.S., M.Ed., M.A.T., M.H.A., M.B.A.), the graduate student must (1) have made passing grades in the first 12 units of course work, (2) have made a grade of *G* or *E* on at least 3 units of this work, and (3) have received the approval of the major department (or in the case of the M.A.T., of the supervisory committee).

Residence Requirements. Candidates for all master's degrees must spend, as a *minimum*, one full academic year, or its equivalent in summer session terms, in residence at Duke University. Those who wish to complete their degrees wholly in the summer session must be in residence for five terms. Depending upon the degree program pursued and the individual student himself, additional time frequently proves necessary. (See section on Residence under Academic Regulations.)

Transfer of Graduate Credits. Under certain circumstances a maximum credit of 6 units may be allowed for graduate courses completed elsewhere. Units from other institutions for such cases will normally be transferred only if the stu-

dent has received for them a grade of *B* (or its equivalent) or better. *In any case, the transfer of graduate credit does not reduce the required minimum registration for a master's degree at Duke.* In planning a master's program, a student who wishes to transfer up to 6 units into his program must, nevertheless, register at Duke for units equivalent to the number he is transferring.

With the approval of both the student's major department and the Dean of the Graduate School, a student who is granted such transfer credit may be permitted to register for as much as 12 units of thesis research instead of the usual 6 units, or he may be permitted to fill out his schedule with as much as 6 units of further undergraduate training or 6 units of required language courses on the undergraduate level. In no case will credit be allowed for extension or correspondence courses.

Credit from graduate courses taken at Duke by a student (not undergraduate or non-degree) before his admission to the Graduate School may be carried over into a graduate degree program if: (1) the action is recommended by the student's Director of Graduate Studies and approved by the Dean, (2) the work is not more than two years old, (3) the amount of such credit does not exceed 6 units, and (4) the work is of *G* level or better. This policy shall be effective with students entering the Graduate School in September, 1971.

Time Limits for Completion of Master's Degrees. The master's degree candidate who is in residence for consecutive academic years should complete all requirements for the degree *within two calendar years* from the date of his first registration in the Graduate School. Any candidate must complete all requirements *within six calendar years of his first registration.*

To be awarded a degree in May, the student must have completed all requirements, including the recording of transfer credit, by the last day of the final examination period. If a thesis is one of the requirements, it must be submitted to the Graduate School Office by April 15. Candidates for degrees in the Graduate School desiring to have their degrees conferred on September 1 must have completed all requirements as of the final day of the Duke University summer session. A candidate completing degree requirements after that date will have his degree officially conferred at the following May Graduation Exercises. (Transfer of credit for work completed at other universities must be recorded by September 1.)

The Thesis. The thesis should demonstrate the student's ability to collect, arrange, interpret, and report pertinent material on his special research problem. Although a publishable document is not required, the thesis must be written in an acceptable style and should exhibit the student's competence in scholarly procedures. Requirements of form are set forth in the Duke University *Guide for the Preparation of Theses and Dissertations.*

MASTER OF ARTS

The Master of Arts degree may be earned either with or without presentation of a thesis. Whether or not a student writes a thesis, however, certain general requirements must be met. If the master's degree requirements are not specified in the departmental heading of this *Bulletin*, a prospective student should go directly to the appropriate director of graduate studies.

Prerequisites. As prerequisites to graduate study in his major subject, the student must have completed a *minimum* of 24 semester hours—12 semester hours of approved college courses in that subject and 12 additional semester hours in that subject or in related work. Since some departments require more than 12 semester hours, the student should read carefully the special requirements listed by his major department, which are included as headnotes to the course offerings in this *Bulletin*.

Language Requirements. The Graduate School requires no foreign language for the master's degree. Individual departments, however, may establish a foreign language requirement for their master's program. (For methods of satisfying language requirements, see the section on Language Requirements in the Chapter on Registration and Regulations.) The language requirements must be satisfied before the master's examination is taken.

Major and Related Subjects. In his graduate work the student must present acceptable grades for a minimum of 24 units of graduate courses. Of these, at least 12 units must be in the major subject. A minimum of 6 units must be in a minor subject or related fields which are approved by his major department. The remaining 6 units of the required 24 may be taken in either the major or in related fields approved by the major department and by the Dean of the Graduate School. The nature of the additional 6 units for which he must register depends on whether he is enrolled in a thesis or non-thesis program; i.e., these last 6 units are earned either with successful submission of the thesis or with such other courses or academic exercises as are approved by the student's department. (See below.) His earned credit for the degree totals a *minimum* of 30 units.

Completing the Program with Thesis. All basic requirements for preparing the thesis, quality of paper, form, and binding are described in the *Guide for the Preparation of Theses and Dissertations*, available in the Graduate School Office. The quality of paper, form, and binding are prescribed in the *Guide*.

Four typewritten copies of the thesis bound in snap binders secured through the Graduate School Office must be submitted in an approved form to the Dean of the Graduate School on or before April 15 for a May degree, or August 15 for a September degree, and at least one week before the scheduled date of the student's examination. The copies will then be distributed by the student to the several members of the examining committee. Two copies for the library and one for the adviser will be bound by the Ruzicka Bindery, upon payment of a fee of \$5.00 per volume. The student should state whether or not he wishes more than three copies so bound.

Completing the Program without Thesis. The options with which a Master of Arts degree may be completed without presentation of a thesis are determined by the individual departments. Normally a student's committee makes its decision on his degree program after he has completed at least 9 units of graded course work. Beyond the 24 units required in major or related course work, 6 units may be earned either with additional course work or with other equivalent

academic exercises approved by the student's department and committee. Such academic exercises might include an additional 3 units of graded course work supplemented, for example, by the following: (1) passing an oral examination on a three to five page research prospectus, plus a substantial bibliography on a topic within the student's major field, or (2) successful submission to the committee of two carefully revised term papers, preferably written originally for different instructors and originally earning a grade of *G* or higher. In any case, the student's total minimum registration will be for 30 units of work, followed by a final examination (see below).

The Examining Committee and the Examination. The instructor who directs the student's program appoints an examining committee composed of himself and two other members of the graduate faculty, one of whom must be from a department other than that of the major. If the student has been permitted to take related work within the major department, the third member may represent the minor field within the department. Nominations for membership on this committee are submitted for approval to the Dean of the Graduate School at least one week preceding the final examination.

The student's committee administers the examination and certifies whether the student has passed or failed by signing the card provided for this purpose by the Graduate School Office. This card is used to indicate completion of all requirements for the degree. If a thesis is presented, the committee also signs all copies of the thesis, and the candidate then returns the original, the first two copies, and any other copies he wishes bound by Ruzicka, to the Dean of the Graduate School, who has them deposited in the University Library.

Filing the Intention to Graduate. On or *before February 1 for a May degree* or on or *before August 1 for a September degree*, the student must file in the Office of the Graduate School, on the official form, a declaration of intention to graduate. If degree requirements have been met before the deadlines above, the intention to graduate must be filed one month before the final examination. The declaration of intention gives the title of the thesis or other academic exercises on which the degree candidate will be examined. The declaration must have the approval of the director of graduate studies in the major department, and of the student's committee chairman.

MASTER OF SCIENCE

The degree of Master of Science is offered in the four fields of engineering—biomedical, civil, electrical, and mechanical—in forestry, in management science, and in physical therapy.

Engineering Prerequisites. As prerequisites to this degree, the student must have earned a bachelor's degree from an accredited engineering college and have completed a minimum of 12 semester hours of work in the major field.

Forestry Prerequisite. As a prerequisite to this degree, the student must have earned a bachelor's degree which represents an undergraduate program in forestry or in an allied field.

Management Science Prerequisites. Graduates from any discipline are eligible for admission since the only specific course prerequisite is one year of calculus. Applicants from the physical and biological sciences, mathematics, engineering, and economics are normally well suited for the program.

Physical Therapy Prerequisites. As prerequisites to this degree, the student must have earned a bachelor's degree and completed the following course work: a minimum of 30 semester hours of laboratory courses in the natural sciences with a minimum of one academic year of biology, chemistry and physics; 15 semester hours in the social sciences, 6 of which must be in psychology; and at least 6 semester hours of mathematics. Introductory courses in statistics and biochemistry are recommended.

Language Requirement. There is no foreign language requirement for students in the Master of Science degree program.

Engineering Program. The work of the Master of Science degree is designed to provide a broad foundation in the fields of biomedical, civil, electrical, and mechanical engineering. The student must present acceptable grades for a minimum of 24 units of graduate courses: at least 12 units in course work in his major area of concentration in engineering (not necessarily confined to the offerings of the engineering department in which the student is registered); a minimum of 6 units in a minor subject outside of engineering which lends broad support to his program (usually in mathematical or natural sciences); and the remaining 6 of the 24-unit course requirement in either the major or minor subject, or in an area approved by the major department. The nature of the additional 6 units for which the student must register depends on whether he is enrolled in a thesis or non-thesis program, i.e., these last 6 units are earned either with successful submission of the thesis or with such other courses or academic exercises as are approved by the student's department. His earned credit for the degree totals a minimum of 30 units.

Forestry Program. The work for the Master of Science degree is designed to provide a basic foundation in a fundamental area of forestry or in a field closely allied with forestry. A minimum of 30 units of credit is required for the degree, of which 24 units must be in formal course work. Specific course requirements call for a minimum of 12 units in a major field of specialization and 6 units in a minor area of concentration. The major and minor fields are determined without regard to departmental divisions of the University if the interdisciplinary nature of the area of specialization makes such a program of study advisable. The specific program of study is developed by the major professor (thesis supervisor) subject to the approval of the Director of Graduate Studies in Forestry and the Dean of the Graduate School.

Management Science Program. The Master of Science in Management program is an evening program for individuals who hold full-time positions and who desire graduate-professional preparation for the management of complex organizations. Forty units of course work are required in a prescribed sequence of 8 units in five consecutive semesters, including the summer. The fifth semester is devoted

to an applied, functional area elected by the student, and to the practicum as a major application of the foundations and tools of completed courses to a significant problem of a complex organization.

A major purpose of the program is to teach the foundations, concepts, and structures useful in the analysis and design of plans and operations of an economic enterprise. The common form of problems within the several segments of the organization and the interrelationships among solutions to problems are emphasized. Such emphasis enhances the manager's capacity to identify the essential variables in a problem and to distinguish between the common form among problems and the uniqueness in any specific case. The resulting flexibility should increase mobility across functions and should help develop the perspective needed to coordinate several unlike functions.

Another purpose of the program is to teach modern tools of analysis so that problems of complex organizations can be understood and solved. Just as important, the tools of analysis should help the manager to continue his own learning. The background needed to learn the most useful additions to the management literature includes both foundational concepts and the modern tools of analysis. This background, as compared with that built in a descriptively oriented program, improves the manager's ability to learn from events in his environment and to do so in an integrated, orderly manner.

Physical Therapy Program. The work for the Master of Science degree is designed to provide a broad foundation in the art and science of physical therapy and opportunities for the development of skills in administration and supervision, experience in curriculum development and directed teaching in physical therapy, and advanced clinical education or research experience. The program of study includes a minimum of 52 units of graduate credit, of which 30 to 32 are in courses in physical therapy, 12 are in designated courses in anatomy and physiology, and 9 are in elective courses in related fields. Completion of the prescribed curriculum requires four semesters of full-time work and a summer program of clinical experience which is conducted under faculty supervision in hospitals and other health agencies.

Thesis and Examination. The regulations and options for completing the program and the provisions for examination and an examining committee are the same as those for the Master of Arts degree discussed in the previous section. However, the Department of Forestry requires a thesis for completion of the M.S. degree.

MASTER OF EDUCATION

Prerequisites. Before a student is admitted to graduate study for this degree, he should have completed, on the undergraduate level, a minimum of 18 semester hours of approved work in education.

Before the degree is conferred the student must have had one year of actual teaching experience, or have met certification requirements by doing supervised student teaching in an accredited school. Such supervised student teaching may be at either the undergraduate or the graduate level.

Completing the Program without the Thesis. The required work includes a departmental major (administration, counseling, elementary education, secondary education, or teaching the emotionally disturbed) of at least 12 units, and a minor of at least 6 units outside the Department of Education. The remaining 12 units are elective within the area of education and the minor field, but require the approval of the student's major adviser and the Director of Graduate Studies.

Toward the end of his residence the student must pass a comprehensive examination on his departmental major. This examination shall be prepared and conducted by the instructors of the student's major as designated by the Director of Graduate Studies of the Department of Education. A request to take this examination should be made to the Director of Graduate Studies at least two weeks before the date on which the examination is to be conducted.

Completing the Program with the Thesis. Students who elect this plan are permitted to substitute a thesis for 6 units of the required course work. The thesis subject must be approved by the instructor who is to direct it and by the Director of Graduate Studies.

In addition to the thesis, the student must present at least 24 units of course credit. Of these, 12 units must be taken in the student's departmental major. Six units, constituting a minor, must be taken outside of the Department of Education. The remaining 6 units are elective within the area of education and the minor field, but require the approval of the student's major adviser and the Director of Graduate Studies.

The regulations governing the thesis are the same as those for the Master of Arts degree.

Recommendation for Teacher Certification. Elementary school teachers who already hold certificates and who desire the recommendation of Duke University for a graduate teaching certificate must include in their master's program a minimum of 12 units in subjects ordinarily taught in elementary school and 12 units in education courses designed to improve them as elementary school teachers.

MASTER OF ARTS IN TEACHING

Prerequisites. The degree of Master of Arts in Teaching is designed for teachers already in service and for recent graduates of liberal arts colleges who wish to teach in a public school, private school, or junior college.

A student should normally have completed a minimum of 12 semester hours in his proposed major subject and an additional 12 semester hours in that or related subjects. Should a student wish to undertake a graduate major different from his undergraduate major, the prerequisites may be modified upon the recommendation of the student's committee and the approval of the Dean of the Graduate School.

Degree Programs. Either of two programs may be arranged, in consultation with the student's committee.

1. A major in education of 18 to 24 units and 12 to 18 units in non-education courses (for students seeking certification): a total of 36 units.

2. A major in non-education courses of 18 to 24 units and 6 to 12 units in education (for students already certified): a total of 30 units.

The non-education courses are to be taken in one or more subjects ordinarily taught in the secondary schools. The amount and distribution of this work will be determined by the needs of the individual student. A combined major in biological sciences or in physical sciences is possible in this program. Teachers who have already completed certification requirements must major in a teaching field in their Master of Arts in Teaching program. Students who have not completed certification requirements must major in education.

The Master of Arts in Teaching may be earned with or without the presentation of a thesis. If a student, in consultation with his committee, elects to present a thesis, 6 units of the total of 30 units required will be allotted to thesis research. He will then be required to complete 24 units of course credits. The regulations governing the thesis are the same as those for the A.M. degree *with thesis*. Candidates for the Master of Arts in Teaching degree who have not had teaching experience are required to take Education 215-216 or 315-316, in which case a minimum of 36 units is required.

The Committee. Each candidate for the degree will be assigned a committee, appointed by the director of graduate studies in the major department or area. This committee will consist of three members, at least one of whom will be from the Department of Education, and at least one from another department. The chairman of the committee will normally be chosen from the department of the major.

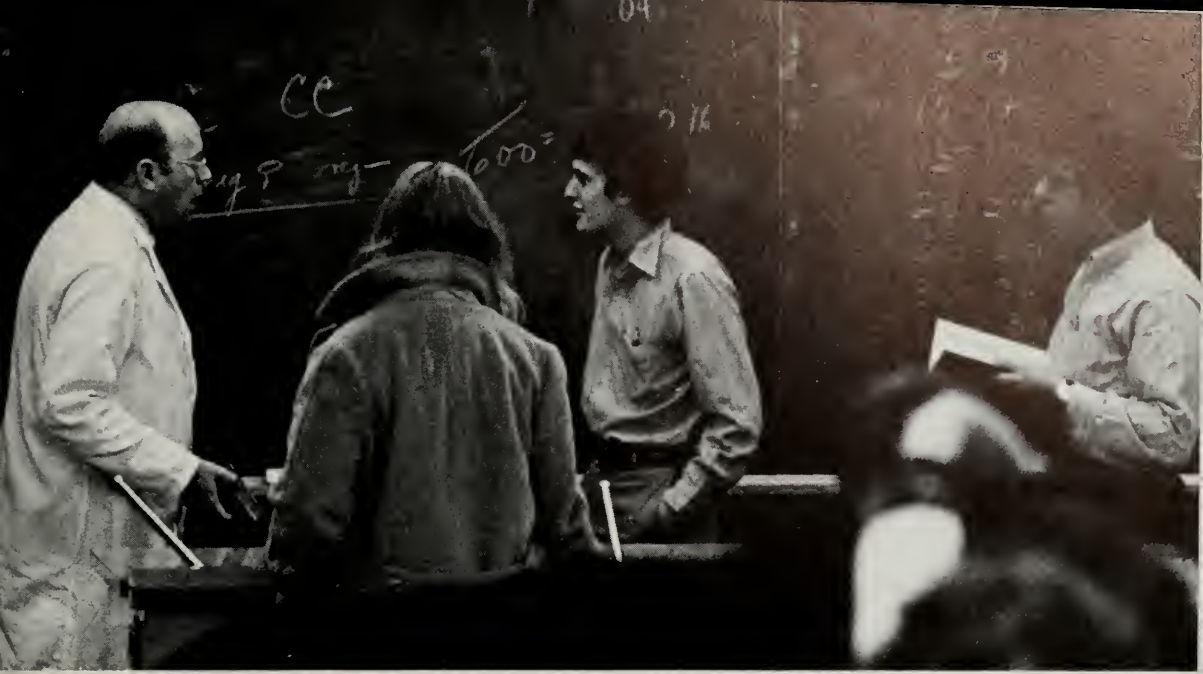
Recommendation for Teacher Certification. Secondary school teachers who already hold certificates and desire the recommendation of Duke University for graduate teaching certificates must include in their master's program a minimum of 18 units in their teaching fields and 6 units in courses in education designed to improve them as secondary-school teachers.

MASTER OF HOSPITAL ADMINISTRATION

Prerequisites. The Master of Hospital Administration degree is designed for persons intending to pursue a career of management in hospitals and other health agencies.

No specific undergraduate major is required for participation in graduate studies leading to this degree, but the following courses are prerequisites: one semester of statistics; one semester of calculus; two semesters of natural sciences; two semesters of economics or political science, or one semester of each; two semesters of psychology or sociology, or one semester of each; and two semesters of accounting, either basic or managerial. In selected cases, students who have not completed all prerequisites may be admitted on a conditional basis subject to the completion of deficiencies while completing other requirements of the degree program.

Degree Program. The program for this degree includes 36 graduate units, of which 18 are in courses in hospital administration and 18 are in designated courses in business administration, economics, political science, and sociology.



Completion of this program ordinarily requires 24 months. Included is a 12-month administrative residency which is conducted under faculty supervision in hospitals and other health agencies within commuting distance of the University campus. A portion of the residency is devoted to preparation and presentation of a written management study.

Comprehensive Examination. Successful completion of a comprehensive examination, consisting of both oral and written phases, is a prerequisite qualification for the M.H.A. degree.

MASTER OF BUSINESS ADMINISTRATION

Prerequisites. The M.B.A. program is designed for students whose undergraduate work included at least one year of calculus and an educational background adequate to enable rigorous analysis. Normally, undergraduate majors in such fields as the physical and biological sciences, mathematics, engineering, and the social sciences are well suited for the program. The M.B.A. program is designed to provide a thorough foundation in the concepts and theory that underlie the design, operation, and control of modern complex organizations.

Degree Program. The M.B.A. program contains a prescribed core of courses dealing with tools of analysis and the fundamental theoretical foundations for demanding administrative practice. In addition, each candidate elects a set of courses to prepare more specifically for his chosen professional practice.

The M.B.A. requires four semesters of full-time work totaling 64 units of graduate course credit. (See the Business Administration section under Courses of Instruction for a more detailed description of the degree requirements.) The M.B.A. program has neither a language nor a thesis requirement. No formal minor subject is required. A project in administrative research and formal writing is required in the fourth semester, and is described in the list of courses as the practicum.

Examinations and Graduation. On or before March 1, candidates for a May M.B.A. degree are notified of their graduation status, and those students required to take master's examinations will be so notified by March 1. All students expecting to complete the requirements for the degree must file their intention to graduate with the Dean of the Graduate School on or before February 1.

The Doctor's Degrees

DOCTOR OF PHILOSOPHY

The Ph.D. degree is essentially a research degree. Although course work is a necessary part of the student's program, the mere accumulation of course credits will not be sufficient for attaining this degree. The granting of the Ph.D. is based primarily upon the student's knowledge of a specialized field of study and upon the production of an acceptable dissertation embodying the results of original research.

Requirements. The formal requirements for the Ph.D. degree are as follows: (1) major or related courses, (2) foreign language(s) in most departments, (3) supervisory committee for program of study, (4) residence, (5) preliminary examination, (6) dissertation, and (7) final examination. In order to be considered for candidacy for the Ph.D. degree, the student must have passed all of his course work in the first year of his graduate study, and on at least 9 units of this course work he must have made a grade of *G* or better.

Foreign Languages. A reading knowledge of one foreign language, ancient or modern, is required by the Graduate School in almost all departments. In a few departments, however, a language is not required. In others, a particular language is specified, and in still others more than one language may be required. If the language requirement is not specified in the departmental heading of this *Bulletin*, a prospective student should inquire directly from the appropriate director of graduate studies. (For methods of meeting the requirement, see Language Requirements.)

A student working toward the doctoral degree should complete the language requirement for that degree by the end of his first year of residence. If he fails to meet the requirement by the end of his third semester of residence, he must register in the appropriate special reading course or courses until he has satisfied the requirement.

The foreign language requirement must be met before preliminary examinations are taken.

Major or Related Work. The student's program of study necessarily demands substantial concentration on courses in his major department. It may, however, include a minimum of 6 units in a minor subject or related fields approved by his major department. Use of related fields within the major department requires the authorization of the Dean of the Graduate School and the Executive Committee of the Graduate Faculty.

Committee to Supervise the Program of Study. As early in a student's course of study as is practicable and *not later than two months before the preliminary examination* the director of graduate studies in the major department will nominate for the approval of the Dean a supervising committee of five, with one member designated as chairman. This committee will include at least three graduate faculty members of the major department and at least one from outside the department. With authorization of the Dean and the Executive Committee of the Graduate Faculty, a minor or related work may be constituted of a clearly differentiated division within the department. The committee will draw up a program of study and administer the preliminary examination and, with such necessary changes as are approved by the Dean, the final doctoral examination. The final examination may be administered with a minimum of four members, one of whom must represent a field other than the major.

Residence. The *minimum* registration requirement is 60 units of graduate credit, of which not more than 30 units may be accepted by transfer. Since a full program is 30 units per academic year, the prospective Ph.D. candidate who enters with the A.B. or B.S. degree must plan to spend in residence a *minimum* of two academic years; if he enters with the A.M. degree, his *minimum* residence is one academic year. (For the definition of *residence*, see the section on residence in the chapter on Academic Regulations). If there are undergraduate deficiencies in his program, he may in addition to the minimum requirements be required to take preliminary undergraduate courses for which he will not receive graduate credit. Even if there are no such undergraduate deficiencies, the student's supervisory committee will determine what requirements, if any, above the minimum the student must meet.

Credit for Summer Work. Credit earned in the summer session will not reduce the minimum required residence (see section on the summer session).

Time Limitations. At the time that the preliminary examination is passed any courses, languages certifications, or other credits for advanced standing which are more than six calendar years old will not be accepted toward fulfilling the minimum requirements of the doctoral degree.

The student should normally pass the preliminary examination by the end of his third year of graduate study. If he has not passed it by the end of the third year of full-time registration, he must file with the Dean of the Graduate School a statement, approved by the director of graduate studies in his major department, explaining the delay and setting a date for the examination. Except under unusual circumstances, extension will not be granted beyond the middle of the fourth year.

The doctoral dissertation should be submitted and accepted within two calendar years after the preliminary examination is passed. Should the dissertation not be submitted and accepted within four years after the examination, the candidate, with the approval of his committee, may petition the Dean of the Graduate School for an extension of one year. Should this extension be granted and the dissertation not be submitted and accepted within the year, the student must pass a second preliminary examination to remain a candidate for the degree. In such a case, the time

limit for submitting the dissertation will be determined by the Dean of the Graduate School and the candidate's committee.

In exceptional cases of particular merit, however, and with the approval of the Dean of the Graduate School, the several departments may extend the limits of the total elapsed time within which credit will be allowed for courses, the language examinations, and the preliminary examination. The graduate faculty of the departments will have these limits in mind when a student is being considered for admission or readmission to the Ph.D. program, for approval to take the preliminary examination, and for approval to submit the dissertation and take the final examination. In instances of excessive elapsed time, revalidation of credits may be required. The responsibility for requiring such revalidation will normally lie with the department, but the Dean's approval will be necessary.

Preliminary Examination. A student is not accepted as a candidate for the Ph.D. degree until he has passed the preliminary examination. A transfer student who may have passed a preliminary examination elsewhere must nevertheless take the examination at the Duke Graduate School. The examination ordinarily covers both the major field and related work. In the summer, a preliminary examination may be scheduled only between the opening and closing dates of the summer session.

Privilege of Re-Examination. Should the student fail the preliminary examination, he may apply, with the consent of his supervisory committee and of the Dean of the Graduate School, for the privilege of a second examination to be taken no sooner than three months after the date of the first. Failure on the second examination will render the student ineligible to continue his program for the Ph.D. degree at Duke University.

Reduction in Registration. Because the student who passes the preliminary examination is eligible for a reduction in required registration, he should assume responsibility for arranging in person with the Graduate School Office the change in registration he desires.

The Dissertation. The dissertation is expected to be a mature and competent piece of writing, embodying the results of significant and original research.

One month before the dissertation is presented and not later than February 1 (February 2 if February 1 falls on Sunday) preceding the May commencement at which the degree is expected to be conferred, the student must file with the Dean of the Graduate School, on the official form to be obtained from the Graduate School Office, the title of the dissertation. This title must receive the written approval of both the director of graduate studies of the student's major department and the professor who directs the dissertation.

The basic requirements for preparing the dissertation such as type of paper, form, and binding are prescribed in the *Guide for the Preparation of Theses and Dissertations* which is available in the Graduate School Office.

The dissertation must be completed to the satisfaction of the professor who directs it. Four typewritten copies bound in snap binders secured through the Graduate School Office must be deposited with the Dean of the Graduate School on

or before *April 1* preceding the May commencement when the degree is to be conferred. The dissertation must be submitted to the Graduate School Office at least seven days before the scheduled date of the student's examination.

All doctoral dissertations are published on microfilm through University Microfilms, Ann Arbor, Michigan. Authors may also copyright them, if they wish. The abstract will be published in *Dissertation Abstracts*.

In brief, all copies of the dissertation, the original in clean type, will remain in spring binders until after the final examination. Three extra copies of the abstract, carefully written and not more than 600 words long, are submitted when the dissertation is first presented to the Graduate School Office. A nonreturnable fee of \$25.00 is charged for microfilming. If copyright is desired, an additional fee of \$15.00 is charged. The original and two copies will be bound by the Ruzicka Bindery at a cost of \$5.00 per volume. The student may request that more than three copies be so bound.

Final Examination. The final oral examination shall be primarily on the dissertation. Questions may, however, be asked in the candidate's major field. Except in unusual circumstances approved by the Dean a final examination will not be scheduled when school is not in session.

If a student fails his final examination, he may be allowed to take it for a second time, but not sooner than six months from the date of his first. Permission to take the second examination must be obtained from the professor who directed the dissertation and from the Dean of the Graduate School. Failure to pass the second examination renders the student ineligible to continue work for the Ph.D. degree at Duke University.

Deposit of the Dissertation. After passing the examination, the candidate brings to the Graduate School Office the original and the first two carbon copies of the dissertation, properly signed, and any other copies he wishes to be bound. At this time he signs the microfilming agreement and pays the binding, microfilming, and copyright fees which are due.

DOCTOR OF EDUCATION

The Doctor of Education degree is a professional degree planned for those who are, or intend to become, school administrators, supervisors, directors of instruction, curriculum consultants, counselors, college teachers of education, or other professional personnel in the field of education. (The Doctor of Philosophy degree is offered in the above areas as well as in Comparative Education, History of Education, Philosophy of Education, and Law and Education.) The following program options are available to the student, subject to the approval of his doctoral committee:

1. A doctoral project consisting of three major research papers judged by the committee to be of publishable quality. The student electing this option shall include in the program of study a minimum of 60 units of course work.

2. A major project or model (for example: a film, curriculum guides, instructional materials, in-service education plans for a school system, computer programs). The student electing this option shall include in the program of

study a minimum of 60 units of credit of which at least 48 units shall be in course work. The remainder of the program may be made up of project research credit.

3. A dissertation embodying the results of significant research. The student electing this option shall include in the program of study a minimum of 60 units of credit of which at least 48 units shall be in course work. The remainder of the program may be made up of dissertation research credit. (The requirements governing the dissertation are the same as those for the Ph.D. degree.)

Requirements. The formal requirements for all options of the Ed.D. degree are as follows: (1) major and related courses, (2) supervisory committee for program of study, (3) registration, (4) experience, (5) preliminary examination, and (6) final examination. In order to be considered for continued enrollment, the student must have made a grade of *G* or better on at least 15 units of the first 24 units of course work at Duke University.

Major or Related Work. The student's program of study necessarily demands substantial concentration on courses in his major department. It must, however, include a minimum of 12 units in related fields approved by his major department.

Residence. Regulations concerning residence requirements, grades required during the first year of graduate study, and the preliminary examination are the same as those for the Ph.D. (See section on the Doctor of Philosophy degree.)

Foreign Languages. There are no foreign language requirements for the Ed.D. degree.

Program of Work. The candidate for the Ed.D. degree will choose as his major field (a) educational administration and supervision, (b) counseling, (c) curriculum and instruction, or (d) education of emotionally disturbed children.

In all cases candidates will take a minimum of 36 units in the major and related areas and a minimum of 12 units in one or more minor areas.

Dissertation. The candidate must write a dissertation, for which the formalities of presentation, including its defense in a final examination, are the same as those for the Ph.D. degree. The dissertation must be a mature piece of writing embodying the results of significant and original research—in essence, a contribution to knowledge or several closely related problems growing out of the student's professional responsibilities. In either case, it must demonstrate the candidate's ability to investigate and report on a significant phase of education in his major field.

The dissertation will be published on microfilm, as is the dissertation for the Ph.D. degree.

Committee to Supervise the Program of Study. At the time of his enrollment in the Ed.D. program, the student will be assigned a temporary adviser. Upon the student's completion of 15 units of work toward the degree, the Director of Graduate Studies will nominate for the approval of the Dean a supervising committee of

five, with one member designated as chairman. This committee will include at least three graduate faculty members from the major department and one from the minor. The committee will draw up a program of study and administer the preliminary examination and, with such necessary changes as are approved by the Dean, the final doctoral examination. The final examination may be administered with a minimum of four members, one of whom must represent the minor.

Residence. The minimum registration requirement is 60 units of graduate credit, of which not more than 30 units may be accepted by transfer. (Transfer credits which are more than six calendar years old at the time that the preliminary examination is passed will not be accepted.) No absolute time limit exists for completing the requirements for the Ed.D. degree provided that the student is continuously engaged in an approved position in education or is in full-time residence. Every student shall be registered for a minimum of 6 units of work during each twelve month period from the time of first enrollment until work for the degree has been completed.

Experience. Prior to receiving the Ed.D. degree, the student must have completed a minimum of two years of employment in professional education.

The program of study must include a minimum of 6 units in practicum, internship, and/or field experience under the direction of one or more appropriate faculty members.

Preliminary Examination. A student is not accepted as a candidate for the Ed.D. degree until he has passed the preliminary examination. The examination is taken during or shortly after the term in which the approved program of course work is completed. It may be oral or, if such a plan is approved by four of the members of the student's doctoral committee including the chairman, the examination may be written. The written examination may be followed by an oral examination upon the recommendation of any member of the doctoral committee.

Should the student fail the preliminary examination, he may apply, with the consent of his supervisory committee and the Dean of the Graduate School, for the privilege of a second examination to be taken no sooner than three months after the date of the first. Failure on the second examination will render the student ineligible to continue his program for the Ed.D. degree at Duke University.

Final Examination. The final oral examination is based primarily on the research papers (option 1), project (option 2), or dissertation (option 3). Questions may, however, be asked in the candidate's major field. Except in unusual circumstances approved by the Dean, a final examination will be scheduled only when school is in session.

If a student fails his final examination, he may be allowed to take it for a second time, but not sooner than six months from the date of his first. Permission to take the second examination must be obtained from the professor who directed the dissertation and from the Dean of the Graduate School. Failure to pass the second examination renders the student ineligible to continue work for the Ed.D. degree at Duke University.



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Special and Cooperative Programs

Center for the Study of Aging and Human Development

The primary aims of the Center have been to encourage and support fundamental research concerned with the processes and health problems of aging; to train investigators for research in the problems of aging; and to develop a source of scientific knowledge in the field of aging for state and local government as well as for private groups and individuals.

The Center conducts a two-year program for predoctoral or postdoctoral fellows who desire to pursue research training in some aspect of the behavioral sciences and psychophysiology in aging and human development. Through faculty seminars and independent work with these fellows are enabled to focus on a chosen aspect of the life spectrum. Methodology and acquisition of specialized skills are stressed in addition to involvement in individual research. Under this program, continuance of research training support for a third year is possible. Resources available include the Psychophysiology Laboratory, research programs in behavioral medicine, child psychiatry, and geriatrics, as well as staff and facilities in anatomy, biochemistry, economics, endocrinology, obstetrics and gynecology, physiology, preventive medicine, psychiatry, and sociology, among others. Inquiries should be addressed to the Training Director, Center for the Study of Aging and Human Development, Duke University, Durham, North Carolina 27706.

Biomedical Engineering Program

The Graduate School offers an interdisciplinary program in biomedical engineering leading to the M.S. and Ph.D. degrees. The purpose of this program is to encourage the optimum combining of engineering and biomedical course work with an interdisciplinary research topic so that the graduates of this program can

contribute at the most advanced professional level to the interdisciplinary field of biomedical engineering.

The major research areas available include: biomechanics, biomedical materials, biomedical modeling, data acquisition and processing, and neural networks. Information about graduate fellowships may be obtained from Dr. Fredrick L. Thurstone, Director of Graduate Studies, Department of Biomedical Engineering.

Center for Commonwealth Studies

The Center for Commonwealth Studies was established at Duke University in 1955 and has received financial support from the Carnegie Corporation of New York, the Rockefeller Foundation, and the Ford Foundation. Its objectives are:

1. To encourage and stimulate by financial assistance and other means the research interests of individual scholars in Commonwealth affairs, European institutions and their expansion, and development studies, and
2. To establish at Duke University a center whose facilities will promote interest in research relating to the Commonwealth, provide the materials for basic research, and encourage research by Commonwealth and American students and faculty.

The Center awards fellowships to graduate students from Australia, Canada, and New Zealand who propose to study toward the Ph.D. degree in economics, history, or political science at Duke University. National selection committees in each of the above mentioned countries facilitate the selection of fellows.

Each spring the Center sponsors a joint seminar for graduate students in economics, history, and political science. The objective of this seminar is to encourage a broad approach to developments within the Commonwealth. In addition, the Center sponsors occasional lectures at the University by distinguished Commonwealth scholars.

Financial assistance is provided to students and faculty at the University for field research in Commonwealth countries. Studies resulting from research sponsored by the Center are frequently published by the Duke University Press in the Commonwealth Study Series, now numbering forty volumes. The Center also distributes in its reprint series selected published articles that relate to the Commonwealth. Inquiries should be addressed to the Director, Center for Commonwealth Studies, Commonwealth House, Duke University, Durham, North Carolina 27706.

Program in Comparative Studies on Southern Asia

The Program in Comparative Studies on Southern Asia was established at Duke University in 1961 following a grant from the Ford Foundation to the Center for Commonwealth Studies to enable it to develop a research and training program in that area. In 1963 the University entered into a contract with the United States Office of Education and sponsored a South Asian Language Training and Area Center under the provisions of Title VI of the National Defense Act. The basic purpose of this program is twofold: to facilitate research on the political, his-

torical, economic, and socio-cultural development of Commonwealth countries in Southern Asia (India, Pakistan, Ceylon, Malaysia, and Singapore) and to provide for the systematic training of graduate students in economics, education, history, political science, religion, and sociology-anthropology, with special emphasis on the area.

The graduate student, in addition to meeting the requirements of the department in which he is enrolled, is expected to take Hindi-Urdu or another major South Asian language, the cognate courses in other departments, and to undertake field research in the preparation of his dissertation.

The program awards each year a limited number of predoctoral fellowships under the conditions specified above. Awards carrying the same expectations are also made under the NDEA Title VI language fellowships offered by the United States Office of Education.

Facilitation and support of research activities by members of the Duke University faculty and graduate students are important aspects of the program's activities. Research grants for faculty and students are also available from the American Institute of Indian Studies and the United States Office of Education. Research facilities include those materials received as a result of the University's participation in a library acquisitions program under the terms of Public Law 480.

The program has undertaken the publication of three series: hardcover monographs, reprints of articles of note dealing with the Southern Asian region, and a series of occasional papers. It also brings visiting Asian scholars to the campus for lectures and symposia, and co-sponsors forums and research activities with the Carolina Population Center of the University of North Carolina.

Inquiries should be addressed to the Administrative Assistant, Program in Comparative Studies on Southern Asia, Duke University, Durham, North Carolina 27706.



Cooperative Program in Teacher Education

(Secondary) (M.A.T. Degree)

Selected graduates of liberal arts colleges who have not completed a teacher preparation program will be admitted to the Cooperative Program in Teacher Education to complete simultaneously in their graduate programs requirements for a teacher's certificate and additional training in the field to be taught. Full-year internships with salary are arranged with cooperating public and private school systems. Students admitted to this program are required to attend the first summer session before their internship. This program is limited to students preparing to teach biology, English, mathematics, and social studies in junior and senior high schools. For materials describing this program, write to the Graduate School, 127 Allen Building, or to Director, Cooperative Program in Teacher Education, Department of Education, West Duke Building.

Cooperative Programs with the Consolidated University of North Carolina

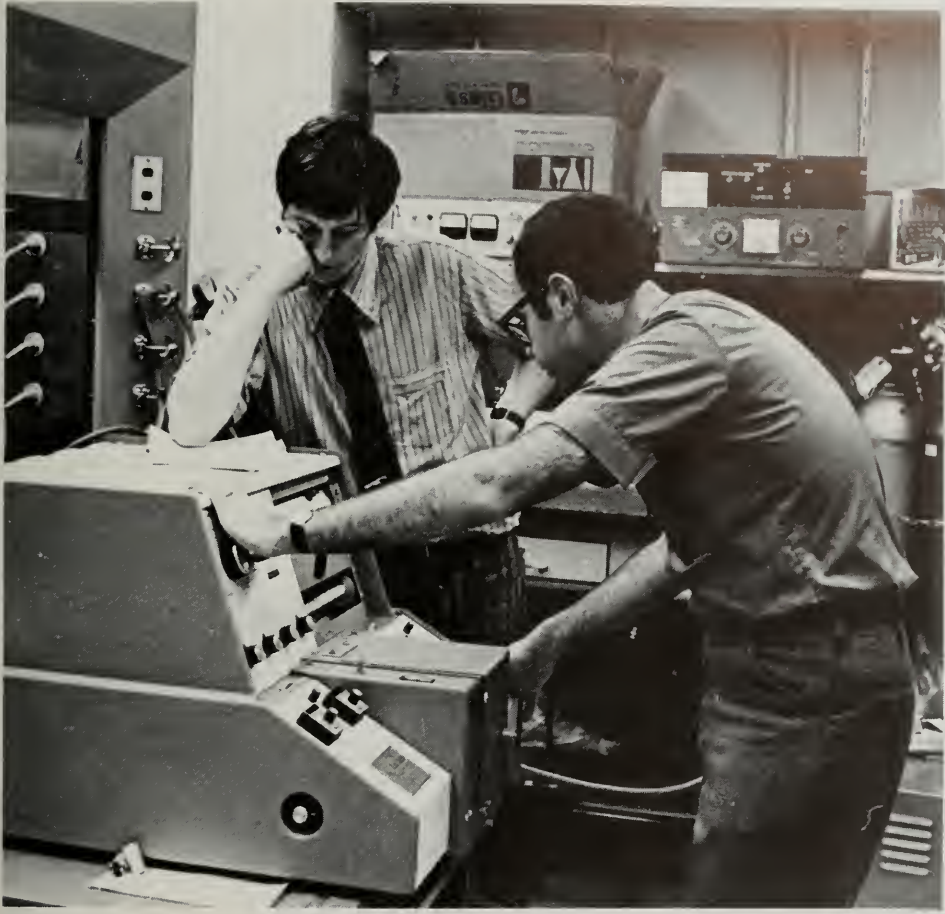
Interchange of Registration. (See Registration, the Reciprocal Agreements with the Consolidated University of North Carolina and North Carolina Central University.)

Library Exchange. Students of both the University of North Carolina and Duke University are granted certain library privileges in the libraries of each university. Books available in one library may be procured through an interlibrary loan service.

Cooperative Program in Russian and East European History. The graduate schools of Duke University and the University of North Carolina offer a cooperative program leading to the M.A. and Ph.D. degrees in Russian and East European studies. Students admitted to one institution are encouraged to enroll in those courses at the other institution that are advantageous to their programs, and to utilize the libraries and facilities of both universities. The holdings of the two libraries in Russian and East European materials are substantial and complementary. Both libraries have a policy of purchasing all significant published works in Slavic history, economics, government, geography, literature, and linguistics. Other joint activities include a monthly colloquium involving the personnel of the two institutions and distinguished visiting scholars.

The University Program in Genetics

Because of the unifying role that genetics has played in development of the biological sciences in the twentieth century, and its relationship to sciences outside the conventional limits of biology, the appointment of geneticists to several academic departments has been a natural occurrence. In order to maintain these mutually beneficial relationships, and to provide for the coherent development



of genetics throughout Duke, the University Program in Genetics was established. The faculty of the program is made up of scientists who hold appointments in various departments. Through their cooperation, an interdepartmental curriculum has been developed; therefore, students in any of several departments may specialize in genetics under the auspices of this interdisciplinary program.

Program in the History of Social Sciences

An interdisciplinary program in the history of the social sciences has been established at Duke University under a grant from the National Science Foundation. Training and research is directed toward the origins and development of the social sciences, new critical assessments of current theory, and methodology. Participating students are Ph.D. candidates in the social sciences, who are exposed to sociological, philosophical, and historical analyses of the development of their subjects in an interdisciplinary context.

The nucleus of the program is an interdepartmental seminar, and special courses on such relevant topics as the History of Economic Thought and Eco-



conomic Policy and the Sociology of the Social Sciences are included in the syllabus. Visiting scholars from other institutions and abroad are invited occasionally to contribute to the program.

Fellowships for graduate students are provided from the National Science Foundation grant and from other University sources. Students may pursue degrees in one of the following departments: Economics, Political Science, or Sociology-Anthropology. The stipends, renewable annually upon successful completion of the year's work, provide support for two years of course work and one year of dissertation preparation. Some assistance is also given for travel to special library collections and archives.

The Perkins Library at Duke contains exceptionally strong holdings in the history of the social sciences, including books, periodicals, and manuscripts. Another resource (published by the Duke University Press) is the *History of Political Economy*, a journal devoted to the history of economic thought.

Inquiries should be addressed to the Program in the History of the Social Sciences, Duke University, 2101 Campus Drive, Durham, North Carolina 27706.

Hispanic Studies Program

The Graduate School offers an interdepartmental program of Hispanic studies leading to the A.M. and Ph.D. degrees. Students may write their theses and take their degrees in history, economics, political science, sociology, or Hispanic languages and literatures. The purpose of the program is to make possible a desirable combination of courses on the Hispanic world in these related disciplines and to bring to bear more strength of the faculty upon the training of a single candidate. This may be achieved through a judicious use of minors or by such special arrangements as may from time to time become necessary.

The Duke University Library holdings have been built up to facilitate graduate work and research in Hispanic-American cultural history, inter-American relations, economic history, politics, and Spanish-American literature. These collections are being enlarged constantly.

Materials-Fields-Mechanics Research Program

The Graduate School offers an interdisciplinary program in materials research leading to the M.S. and Ph.D. degrees. Students write their theses and take their degrees in one of the engineering departments but have access to the resources of an interdepartmental faculty, comprising the Materials Research Group. The purpose of the program is to encourage and facilitate research on the interactions of materials with various fields (stress, thermal, electromagnetic, fluid, etc.).

Requests for information about specific research areas available may be obtained through the directors of graduate studies in biomedical, civil, electrical, and mechanical engineering.

Medical Scientist Training Program

The Medical School and the Graduate School of Duke University cooperate in offering a program which leads to both the M.D. and the Ph.D. degrees. It is the purpose of this program to produce individuals competent both as clinicians and as basic scientists. Graduates of the program are expected to gravitate toward faculty positions in the medical schools of this country and to contribute significantly, through their research efforts, to the advancement of medical practice. Applicants to this program must satisfy the admissions requirements of the Medical School and of the science departments of the Graduate School and should be able to offer some evidence of a serious interest in basic research. This program enables its participants to achieve both degrees in one year less than would be required to obtain them outside of this program.

The first two years of study are spent in the Medical School mastering the core curriculum of preclinical (first year) and of clinical (second year) sciences. The participants then devote full time to graduate studies in one of the basic science departments of the University. When the requirements for the Ph.D. are completed, the students return to the Medical School for an additional year of clinical experience and thus complete their requirements for the M.D. degree. Funds are available which provide for payment of stipends and tuition for the duration of the students' participation in this program. Six of the twelve students who enter this program each fall are fully funded in this manner. The remaining students are ordinarily provided with such funds only during the years spent in earning the Ph.D. degree.

It is anticipated that students in this program will spend three years enrolled in the Medical School and a minimum of three years enrolled in the Graduate School.

Inquiries concerning this program should be directed to Dr. Irwin Fridovich, Associate Director, Medical Scientist Training Program.

The Medical Historian Training Program

The Medical Historian Training Program is conducted under the auspices of the School of Medicine and the Graduate School to provide professionally trained medical historians and is supported by the Josiah Macy Jr. Foundation. A minimum of six years of graduate study is required. Upon satisfactory completion of the program, the Doctor of Medicine and Doctor of Philosophy degrees will be awarded. It is anticipated that graduates will undertake a minimum of one year of postgraduate medical training, following which their major effort will be in teaching and scholarly activities in the field of the history of medicine with minor clinical responsibilities.

Basic requirements are two academic years in the School of Medicine consisting of "core" basic sciences in the first year, ending with the course Introduction to Clinical Medicine, and "core" clinical sciences during the second year, following which the student enters the Department of History in the Graduate School.

Candidates for the Ph.D. degree in history devote approximately two full years to the completion of their required courses, work in seminars, and preparatory study of their preliminary or qualifying examinations. The actual length of time needed to earn the Ph.D. degree depends upon the number of years beyond this two-year period candidates find necessary for research and writing of their dissertations. Candidates will pursue studies in the Department of History during the third and fourth academic years of the program. In the fifth and sixth years, the student should have one year in which to pursue medical-historical research and one year of elective courses in the School of Medicine to fulfill the requirements for the M.D. degree.

Application and Admission Procedures. Applicants must meet the requirements for admission to the School of Medicine and the Graduate School in the Department of History. Candidates who have completed two years of medical school will also be considered.

In addition to the minimum requirements established by the School of Medicine and the Graduate School, courses in history and the history and philosophy of science will count heavily in the selection of candidates.

Applicants should complete and submit an application to the Graduate School for admission to the Department of History.

Financial Support. Annual traineeship awards, consisting of stipends beginning at \$2,400, full tuition, and \$500 for each dependent as well as limited travel expenses to attend meetings in the history of medicine, are available to accepted students. Stipend levels exclusive of allowances are increased each year to a maximum of \$5,500.

Additional information may be obtained by writing to Gert H. Brieger, M.D., Ph.D., Director, Medical Historian Training Program, Box 3702, Duke University Medical Center, Durham, North Carolina 27706.

Program in Medieval and Renaissance Studies

The Graduate program in Medieval and Renaissance Studies is administered

by the Duke University Committee on Medieval and Renaissance Studies. A participating student is based in one of the regular departments and fulfills the Ph.D. requirements for that discipline, and in addition he takes a program of electives which will aid his interdisciplinary competence in the Medieval or Renaissance areas (or some intellectually valid combination of the two). Such a program includes a choice from the fields of art, history, language and literature, history, philosophy, and religion. In other words, the student is enabled to minor in Medieval and Renaissance Studies.

The Committee on Medieval and Renaissance Studies sponsors also an undergraduate program, the *Journal of Medieval and Renaissance Studies*, a monograph series in the field, and lectures by distinguished visiting scholars.

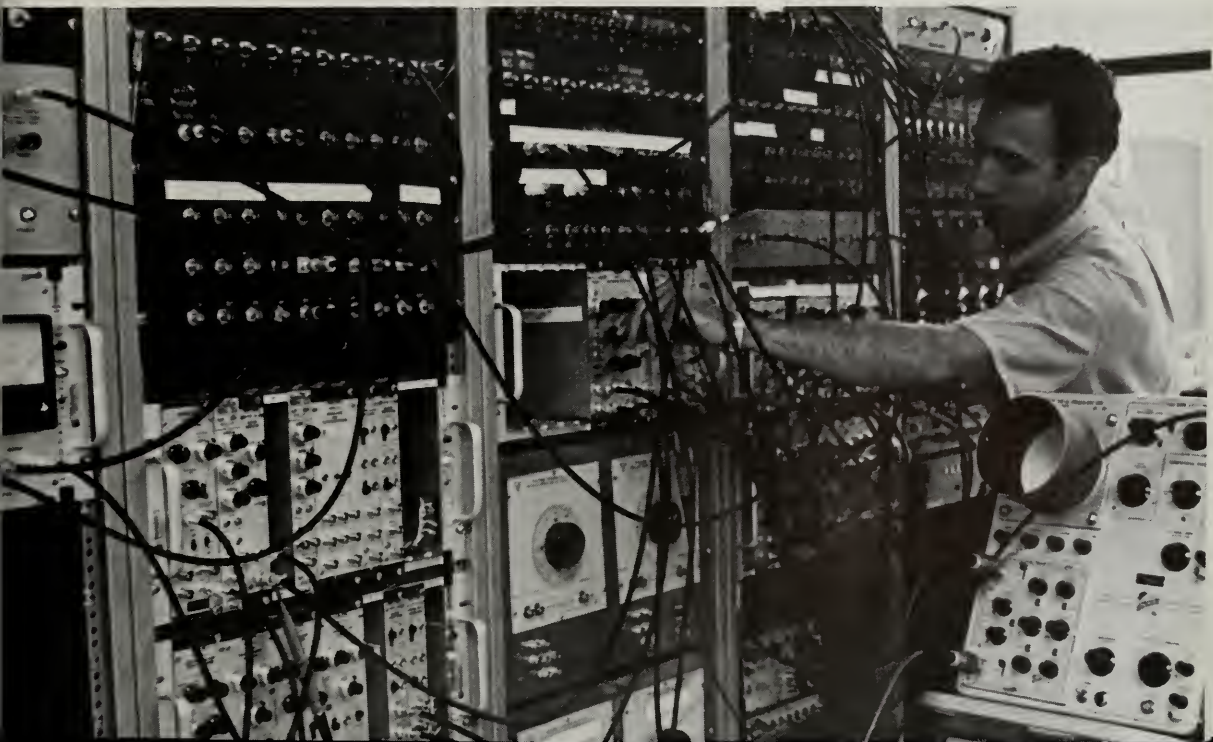
Inquiries should be addressed to the Chairman of the Duke University Committee on Medieval and Renaissance Studies, 127 Allen Building.

Oak Ridge Institute of Nuclear Studies

Duke University is one of the sponsoring universities of the Oak Ridge Institute of Nuclear Studies located at Oak Ridge, Tennessee. The graduate research program at Duke has available to it all the facilities of the Oak Ridge National Laboratory and the cooperative supervision of student research by the staff at Oak Ridge. Fellowships in several fields of science are available to qualified applicants.

Graduate Fellowship Program. On application by a university, the Institute awards fellowships to candidates for the master's and doctor's degrees. The student uses the fellowship to conduct his thesis research in an Oak Ridge laboratory.

AEC Special Fellowships. These are available in the fields of (1) nuclear science and engineering, (2) health physics, (3) advanced training in health physics, and (4) industrial hygiene.



The application deadlines differ for different fellowships. Further information may be obtained from Lewis E. Anderson, Department of Botany.

Organization for Tropical Studies

Duke University is a member of a consortium created to promote an understanding of tropical environments and their intelligent use by man. To achieve these objectives, OTS fosters research and educational programs in the New World tropics.

Fellowships are available for travel and subsistence in field-oriented programs in Central America. The basic course, Tropical Biology: An Ecological Approach, runs for an 8-week period in February-March and July-August. Advanced offerings are periodically scheduled in agriculture, anthropology, botany, earth sciences, forestry, geography, marine biology, meteorology, and zoology.

The course schedules and application deadlines vary from year to year. Consult the respective university departments for current information on OTS activities.

The Population Studies Program

The Population Studies Program at Duke University was established in 1963 as a joint enterprise of the Departments of Economics and Sociology and was charged with both educational and research functions in the area of demography and human ecology.

Training under the auspices of the program leads to a Ph.D. degree within the Departments of Sociology or Economics with a specialization in population studies. Two training tracts are available, one in each department. Each is designed to provide an integrated and cross-disciplinary training in the common specialty area of population studies. The bearing of economic and sociological theory upon the analysis of demographic phenomena is emphasized and active participation in ongoing population research projects is afforded trainees.

In addition to cross-departmental courses, program unity is produced through a Population Studies Seminar. This seminar, which is non-credit and informal, is attended by advanced students and faculty in both departments. The seminar provides presentations on demographic research conducted by both faculty and students in the two departments. It also serves as a vehicle for a number of visiting lecturers in demography each semester.

Graduate fellowships for students in the program are available. Inquiries may be directed to Dr. George C. Myers, Director, Population Studies Program, Box 4732, Duke Station, Duke University, Durham, North Carolina 27706.

Social Systems Simulation Program

This is an interdisciplinary program to stimulate the use of model building and computer techniques in the social sciences. Although an outgrowth of the Econometrics Program, it is broadly based in that it involves faculty participation from

business administration, economics, education, mathematics, political science, psychiatry, psychology, and sociology. It provides resources and facilities to predoctoral students pursuing Ph.D. work in a variety of fields. Inquiries should be addressed to the Director, Social Systems Simulation Program, P. O. Box 4774, Duke Station, Durham, North Carolina 27706.

Stochastic Systems Program

A comparative program in stochastic systems analysis is sponsored by the Department of Electrical Engineering at Duke and the Department of Statistics of the University of North Carolina at Chapel Hill, in cooperation with the Departments of Mathematics at the two institutions. The program is designed for graduate students interested in applications of stochastic processes and statistical inference. A student interested in this area may enroll in any one of the sponsoring or cooperating departments in a program leading to a master's or a Ph.D. degree, awarded through that department. Mutual interaction between the departments is provided by complementary course offerings and cooperative student advising. The student may thus arrange a variety of programs within the general stochastic systems area, emphasizing the more theoretical or the more applied aspects at his discretion. In addition to the courses regularly available, special courses will be offered on various topics. A stochastic systems seminar is an integral part of the program. Further information concerning this program may be obtained from either the Director of Graduate Studies, Department of Electrical Engineering, Duke University, or Dr. C. R. Baker, Department of Statistics, University of North Carolina, Chapel Hill 27514.



3

Resources for Study

The Libraries

The William R. Perkins Library has shelf space for 1,500,000 books, seats for 1,250 readers, and a staff of 200. With the completion of the renovation of the old building in the spring of 1970, the entire complex provides room for 2,500,000 books and 2,100 readers. The reader stations include about 700 carrels, 200 closed and 500 open, of which 475 are in the new building.

On the main floor—at ground level—are the reference and loan departments, bibliography, current periodicals, interlibrary loan, and all units of technical processing. Documents, newspapers, microtext collection, and the microphotography laboratory and other copying facilities are located on the floor below. The administrative offices and graduate reading room are on the second floor, and manuscripts and archives on the third. Twelve small reading and study rooms are provided in the stacks for the departments in the humanities and social sciences that grant the doctorate. Four seminar rooms are also provided in the stacks.

Microphotography and photographic services utilize modern equipment for reproducing printed and manuscript materials and for the reading of materials in the microtext collection. A special room has been set aside for film readers.

In addition to the collection in the Perkins Library there are nine school and departmental libraries with holdings of some 2,229,500 volumes. The undergraduate library has 7,100 volumes; Divinity School, 155,200 volumes; Engineering, 47,300 volumes; Law, 172,100 volumes; Medical Center, 106,400 volumes; Woman's College, 194,700 volumes; Biology-Forestry, 112,800 volumes; Chemistry, 28,000 volumes; Mathematics-Physics, 41,200 volumes. One hundred thousand volumes were added in 1970-71. Approximately 11,000 periodicals and 185 newspapers are received currently.



The extensive resources of the Library for research students may be suggested by the following special collections:

The Trent Collection of Walt Whitman, containing the first and all other important early editions or issues of *Leaves of Grass*; books and articles of Whitman biography and criticism; nearly 300 manuscripts and 400 letters; and pictures, sheet music, and other miscellanea.

The George Washington Flowers Collection of books, manuscripts, pamphlets, and newspapers on all phases of Southern history.

The Arents Collection of several hundred volumes relating to the culture and production of tobacco and the manufacture and distribution of tobacco products.

The James A. Thomas Collection of books on Chinese history and culture.

The Guido Mazzoni Library, a collection of approximately 23,000 volumes and 67,000 pamphlets covering the whole range of Italian literature, with special strength in the nineteenth century.

The Gustave Lanson Library of 12,000 books and monographs on French literature.

Latin-American Collections, built around a special Peruvian library of 7,000 books and manuscripts, a Brazilian library of several thousand volumes, and an Ecuadorian library of 2,000 volumes, supplemented by strong collections of the public documents of these and other Latin-American countries.

The Robertson Library of Philippiniana.

The Frank C. Brown Folklore Collection, consisting of about 38,000 manuscript pieces, 1,400 vocal recordings, and 650 musical scores of North Carolina folklore.

The Strisower Library of international law, numbering about 5,000 volumes, with many rare books and periodical files.

The Trent Collection in the History of Medicine (Medical Center Li-

brary), containing about 3,000 books and 2,500 manuscripts with special strength in anesthesia, anatomy, English medicine, vaccination, yellow fever, pharmacy, and medical biography.

The Holl Church History Library, dealing primarily with the period of the Reformation.

The Frank Baker Collection of Wesleyana and British Methodism, consisting of 1,500 editions of the works of John and Charles Wesley, 8,000 volumes concerning all phases of the development of British Methodism, 4,000 volumes relating to the religious and social background of British Methodism, and 4,000 manuscript pieces by the Wesleys and their coadjutors and by British Methodists of the last 200 years.

Collections in English and American Literature, where emphasis has been placed principally on the eighteenth and nineteenth centuries, with the collections of Swinburne, Tennyson, Rossetti, and Bryant, significant groups of annotated copies and first editions of Coleridge and Byron, the Carroll Wilson collection of Emerson, some 5,000 items of eighteenth-century English poetry and prose, and the Paul Hamilton Hayne library of American literature.

In addition to these and other special collections, the libraries contain excellent files of United States federal and state documents, public documents of many European and Latin American countries, and publications of European academies and learned societies. The newspaper collection, with 15,000 volumes and 28,000 reels of microfilm, has several long eighteenth century files, strong holdings of nineteenth century New England papers, and of ante-bellum and Civil War papers from North Carolina, South Carolina, and Virginia; there are also many European and Latin American papers. The manuscript collection of 4,000,000 items is particularly strong in all phases of the history, politics, and social and economic life of the South Atlantic region, although it also includes significant papers in English and American literature, and several notable medieval manuscripts in both Greek and Latin.

Science Laboratories

Botanical and Zoological Laboratories. Facilities for graduate study in the Departments of Botany and Zoology are located on the West Campus. The Biological Sciences Building, completed in 1962, contains well-equipped modern laboratories for teaching and research in the various fields of botany, forestry, and zoology. Special facilities are available, such as animal rooms, greenhouses, darkrooms, refrigerated and controlled-environment laboratories, scanning and transmission electron microscopes, a Van de Graaff accelerator, X-ray machines, radiation and radioisotope equipment, and other modern research facilities. Extensive facilities for experimentation in the environmental control of plant growth are available in the new phytotron adjacent to the botany greenhouses.

The Herbarium, containing over 360,000 specimens, is worldwide in scope and includes notable collections of mosses and lichens. Other unique assets for teaching and research are the Sarah P. Duke Gardens, conveniently located on the

West Campus; the four-acre experimental plot and field laboratory developed by the Department of Botany; the Duke Forest, comprising 8,000 acres of woodland adjacent to the West Campus; the field station for the study of animal behavior; and the Duke University Marine Laboratory at Beaufort, North Carolina. Duke University, through the Botany and Zoology Departments, is a member institution of the Organization for Tropical Studies in Costa Rica, a facility providing excellent opportunities for course work and research in tropical flora and fauna.

Scholarships for advanced study during the summer months are maintained at the Highlands Biological Laboratory, Highlands, N.C.; at the Marine Biological Laboratory, Woods Hole, Massachusetts; and at the Duke University Marine Laboratory. Requests for information concerning scholarships at the Highlands Laboratory should be addressed to the Botany Department, those at Woods Hole to the Zoology Department, and those at Beaufort to the Duke University Marine Laboratory.

The Phytotron. The phytotron, officially known as the Duke University unit of the Southeastern Plant Environment Laboratories, is connected to the Biological Sciences Building on West Campus. The facility is administered by the Botany Department. The phytotron is an integrated series of plant-growth rooms, chambers, and greenhouses. Over fifty separately controlled environments provide more than 3,000 square feet of plant growing space. The controlled units consist of artificially lighted rooms with temperature and humidity control, reach-in chambers, and six temperature-controlled greenhouses. By using the conditions in various day and night combinations an exceptionally large number of environments can be obtained for testing the growth responses of plants. The phytotron also includes research laboratories and facilities for studying and monitoring the physiological processes of plants.

Research space in the phytotron is available to graduate students and faculty at Duke and to members of other educational and research organizations. For information concerning awards and research space, write to the Director, Dr. Henry Hellmers, Department of Botany, Duke University, Durham, North Carolina 27706.

Marine Laboratory. The Duke University Marine Laboratory is located at Beaufort, North Carolina, one and one-half miles from the open ocean. The physical plant includes five well-equipped research buildings, three classrooms, and four dormitories. The laboratory provides excellent facilities for summer graduate courses in botany, chemistry, geology, and zoology, and for thesis research throughout the year. Special research and training facilities for field work in marine biology and biological oceanography include two motor vessels and a 118-foot biological research vessel *Eastward*, with specialized apparatus for collecting and environmental measurements.

Six National Science Foundation Predoctoral Traineeships in biological oceanography are available to advanced graduate students during the academic year. Other awards are usually available. For example, in the summer of 1970 twenty National Science Foundation Predoctoral Awards were offered for course or research work in marine biology at the Marine Laboratory. For information concerning awards and research space, write to the Director, Dr. John D. Costlow, Duke University Marine Laboratory, Beaufort, North Carolina 28516. For informa-



tion concerning courses refer to Marine Sciences—the University Program under the Courses of Instruction.

Animal Behavior Station. Located less than one mile from the campus, the 80-wooded acres of the station provide facilities for the studies of penned, free-ranging, and caged animals. These facilities include soundproof observation chambers, barns, aviaries, and pens for large mammals and birds, and two waterfowl ponds. An extensive facility for the study of prosimian primates (both simulated natural habitats and cages) was completed in 1968. For information regarding research space or research assistantships in animal behavior, write to Dr. P. H. Klopfer, Department of Zoology.

Primate Facility. A large colony of prosimian primates is housed in the Duke University Primate Facility, adjacent to the Field Station for the Study of Animal Behavior. Research programs in biochemical and molecular genetics, cytogenetics, comparative anatomy, behavior, and reproduction are conducted with the use of the animals as a major resource. For information about graduate study in primate biology and about research space, write to Professor John Buettner-Janusch, Department of Anatomy.

Physics Laboratories. The Physics Building, comprising about 130,000 square feet of floor space, is devoted to research and instruction in the Departments

of Physics and Mathematics. An additional 27,000 square feet of space are provided in the Nuclear Physics Building completed in 1968 and located adjacent to the Physics Building. Graduate students are provided with office space in one of these two buildings.

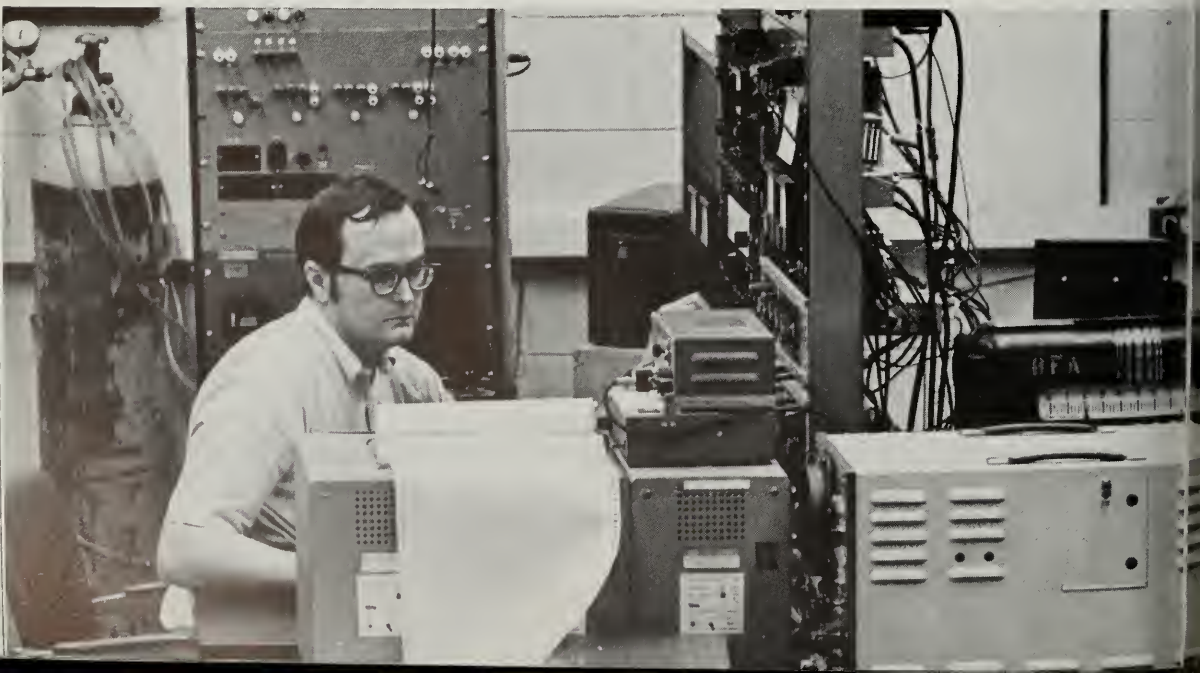
In addition to the lecture halls and the elementary laboratories, there are instructional laboratories for work in electronics and advanced physics.

About half the building is devoted to special laboratories for research in microwave spectroscopy, atomic, nuclear, high energy, low temperature, and solid state physics. Special equipment includes microwave spectrographs operating up to 500,000 megacycles; one 4 MEV and one high resolution 3 MEV Van de Graaff accelerator, a 30 MEV cyclotron/tandem Van de Graaff accelerator; a helium liquefier, cryostats, magnets, and associated equipment for research down to the millidegree Kelvin temperature range; a Sigma-5 and a DDP-24 computer used for automatic measurement and processing of bubble chamber film in the High Energy Physics Laboratory; and two DDP-224 computers used to collect and process data in the Nuclear Structure Laboratory.

The Physics-Mathematics Library contains an unusually complete selection of books and periodicals. A large, well-equipped instrument shop staffed by nine instrument makers, four electronic technicians, and a glass blower is in the building.

Chemistry Laboratories. The Chemistry Department occupied a new building in 1969. Named after Dr. Paul M. Gross, a distinguished member of the faculty for many years, the building contains three and one-half floors which provide 146,440 square feet of total area. The usable space is over twice that of the original building, and will allow considerable growth of departmental research programs as well as faculty and student body. The entire building is air-conditioned and is electrically heated.

The Chemistry Department is well equipped for performing research in many areas of current interest. Among instruments available for general use in various research problems are Varian T-60 and A-60 Nuclear magnetic resonance spectrometers, a Varian C-1024 time averaging computer, a Consolidated Electro-



dynamics Corporation Type 21-490 mass spectrometer, a Bendix time-of-flight mass spectrometer Model 12, a Perkin-Elmer Model 621 infrared spectrophotometer, and other recording spectrophotometers for infrared and ultraviolet-visible studies. The department also utilizes numerous analytical and preparative gas chromatographs. Some other instruments of primary importance to specific research projects include Varian V-4502-12 and V-4502-15 electron paramagnetic resonance spectrometers, Varian HR-60 and Bruker 100 Mc HFX-10 nuclear magnetic resonance spectrometers, a DSC-1B differential scanning calorimeter, a Baird-Atomic Fluorespec spectrofluorimeter, Carey Model 14R and Model 15 ultraviolet-visible spectrophotometers, a Durrum-Jasco ORD/UV/CD-5 recording spectropolarimeter and circular dichroism recorder, a Durrum-Gilison stopped flow spectrophotometer, polarographs, a flame photometer and optical equipment for photochemical and kinetic studies. Equipment for X-ray crystallographic investigations includes a Rigaku-Denki low-angle X-ray diffractometer, a Kratky U-Bar camera, a General Electric XRD-5 diffractometer, a Picker automated full-circle X-ray diffractometer, an Enraf-Nonius automatic diffractometer, Debye-Scherrer powder cameras, and single crystal Weissenberg and precession cameras.

The department has a machine shop, an electronics shop, and a glass-blowing shop. The facilities of the Duke University Marine Laboratory on the coast at Beaufort, North Carolina, are available for specimen collection and processing in studies of organic chemicals of marine origin.

Psychology Laboratories. The Psychology Department occupies new and fully renovated quarters, comprising about 53,000 square feet of floor space, which house its main laboratories, seminar rooms, classrooms, and special facilities. The building is completely air-conditioned for year-round research and study. For the use of graduate students and staff, the department houses a periodical reference room with an extensive collection of current and bound journals and monographs in psychology and related subjects. In addition to general purpose laboratories, there are special facilities for studies of animal behavior; soundproofed and electrically shielded rooms for use with human and animal subjects; specially equipped rooms for the study of visual perception; electrophysiological recording rooms; a histological laboratory and surgery; and photographic darkrooms. The social psychology unit (used jointly with the Department of Sociology) contains observation, communication, and recording facilities for the study of social interaction. There is an extensive suite of interview and observation rooms for the study of human personality and clinical processes. Automatic computation equipment is available for all research purposes. A departmental shop, with competent technicians in charge, is maintained to provide specialized mechanical and electronic apparatus. Other facilities for research and teaching are available in the laboratories and clinics of the adjacent Duke Medical Center.

A number of clinical installations for adults and children, devoted to an extensive range of clinical and guidance problems, cooperate with the department in providing facilities for research and training. In addition, the department operates a Preschool Laboratory for four- and five-year old children. The department cooperates with the Department of Zoology in the operation of an 80-acre field station in the nearby Duke Forest for the study of animal behavior in natural settings. (See Animal Behavior Station.)

Computation Center. The Duke University Computation Center provides the University faculty and students with a facility for research and instruction.

The center is presently equipped with an IBM System 360 Model 40 (192K bytes, one 2314 disk facility, three tape drives, two card readers, two printers, and a Calcomp plotter) which is connected by high-speed telephone lines to an IBM System 370 Model 165 (two million bytes of memory, three 2314 disk facilities, five tapes, card reader, and printer) located at the Triangle Universities Computation Center which is in the Research Triangle Park. In addition, there are two medium-speed terminals (card reader and printer) located in the Engineering Building and in the Sociology-Psychology Building, and several low-speed keyboard terminals.

The Triangle Universities Computation Center (TUCC) is a nonprofit corporation formed jointly by Duke University, North Carolina State University at Raleigh, and the University of North Carolina at Chapel Hill. The purpose of the TUCC is to provide computing capabilities equal in quality to the finest available.

Faculty members at Duke may use the facilities of the Computation Center by filling out an application for computer services. All users of the Computation Center facilities are urged to obtain funds to pay for computer services. However, any user unable to obtain grant funding may ask for financial support from his department when he applies for the services.

More specific information regarding Duke computing facilities may be obtained from the Director of the Computation Center.

Engineering Research Laboratories. The laboratories of the four departments which comprise the School of Engineering contain a wide range of basic equipment that finds general application in the several fields of specialization. In addition, each laboratory contains selected items of highly sophisticated equipment used to support advanced research in areas of particular emphasis. The exceptionally fine facilities available for instruction and research are suggested by the following brief listing of selected items to be found in the four departments:

Biomedical Engineering. Holography and ultrasound apparatus; high energy CW helium-neon gas laser, and interferometrically stable table; cellular electrophysiology and neurophysiology instrumentation; stereomicroscope, micromanipulators, stimulators, isolation units, and microelectrode puller; facilities for studying biomedical materials and surface interactions; polarizing microscope, internal reflectance infrared spectrophotometer, and dialyzers; cardiorespiratory measurements; respirator, pressure transducers, and DEC PDP-12 digital computer.

Civil Engineering. Closed-loop, electrohydraulic dynamic loading system capable of applying pulses of any shape, of magnitudes up to 5,000 pounds, and controlled in either force or displacement modes in frequencies from zero to 100 cycles per second; vacuum-forming facilities for structural shell models; high-speed digital strain-measuring and recording systems; ultra-high-pressure triaxial shear apparatus for confining pressures up to 100,000 p.s.i.; high-speed camera for studying explosions and similar phenomena; large-aperture research polariscope; reflective photoelastic polariscope; sustained-loading facility for long-duration studies of prestressed concrete.

Electrical Engineering. High-resolution (7\AA) electron microscope with heating and tilting stage; stereo optical microscopes; ion-pumped bakeable ultra-high-vacuum unit; helium dewars and cryostats; 9.5-inch magnet and regulated power supply with complete nuclear magnetic resonance system; spin-echo spectrometer; X-ray diffractometer with monochromator attachment; furnaces; environmental test chambers; analog computer facility; multichannel tape and strip-chart recorders; complete x-band microwave instrumentation system; sampling oscilloscope; cryomagnetic facility for susceptibility measurements; DEC Linc 8 and PDP-8/I computers.

Mechanical Engineering. Digital data acquisition system, with high speed scanner and printed tape output; FM-AM instrumentation tape recorder; spectrum analyzers; storage and dual-beam oscilloscopes; oscillograph; X-Y and strip-chart recorders; temperature, pressure, strain, force, and acceleration transducers; electrodynamic shaker table; sound room with associated sound measuring and analyzing equipment; experimental vacuum transport system (1800 ft. x 1 ft. diameter); fuel research engine; materials laboratory with injection molding, high temperature microscope, stereo-zoom research metallograph, heat-treating and arc-melting furnaces.

Available to graduate students in all four departments of the School of Engineering are also the Central Service Shop facilities of the School, as well as those located elsewhere on the campus.

The School of Engineering houses an IBM Model 2780 medium-speed card-reader punch and printer which communicates directly with the IBM System 370 Model 165 computation facility that is located in the Triangle University Computation Center in the adjacent Research Triangle Park.

Forestry Sciences Laboratory. The U.S. Forestry Sciences Laboratory of the Southeastern Forest Experiment Station is located in the Research Triangle Park near Durham. This research organization provides outstanding opportunities to complement the research conducted by students in the Department of Forestry. Specialized research projects in forest entomology, pathology, physiology, and soils are currently underway at the laboratory. The staff of the laboratory is available for consultation and participation in seminars. Arrangements may be made for students to conduct certain aspects of their research at the laboratory.

Duke Forest. The Duke Forest serves as an outstanding field laboratory for the students and faculty of Duke University. This forest consists of about 8,000 acres on which grow various types of forests characteristic of the southeastern Piedmont region. Shortleaf pine, loblolly pine, and southern hardwoods represent the main timber types.

Much of the Duke Forest is adjacent to the campus and easily accessible for those who are working in the fields; therefore, students and faculty have excellent opportunities to conduct studies in various fields of forestry such as ecology, entomology, land management, meteorology, pathology, physiology, and soils.

Many faculty members and students in other departments of the University such as Botany and Zoology also use the Duke Forest in which to conduct research.



4

Student Life

Living Accommodations

Housing. Duke University provides residence hall accommodations for single graduate and professional men, and residence hall and apartment accommodations for single graduate women. Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specified term. Since no married student housing facilities are available, the Department of Housing Management provides assistance to married graduate and professional school students in locating suitable housing in Durham, where varied types of living units are reasonably available.

The Graduate Center houses men and women enrolled on a full-time basis in the Graduate and professional schools. The Graduate Center houses 149 male graduate students, 56 women graduate students, and 117 women undergraduates. Commons facilities on the main floor are shared by men and women. Graduate women are also assigned to Town House Apartments (located between the Trinity College and Woman's College campuses) and to Hanes Annex, a residence hall. Hanes Annex has 39 beds for graduate students. The second floor of this building is used by seniors in the School of Nursing, and commons areas are jointly used by the two groups.

The University operates Town House Apartments primarily for women students of the Graduate School. Others are housed in individual apartments. There are 30 two-bedroom units, each furnished for three occupants. Two students occupy the master bedroom with adjoining half-bath, and the third occupies a smaller bedroom. A living room, kitchen, and full bath complete the living arrangement. Additional features are air conditioning and a swimming pool. The campus bus, serving all parts of the University, is accessible to the Town House Apartments.

Detailed information about University housing facilities for single students, and the housing assistance program for married students, will be provided upon request by the Department of Housing Management, Duke University, Duke Station, Durham, North Carolina 27706.

Rooms in residence halls and spaces in the Town House Apartments or other rental units may be reserved by applicants only if they have been accepted by the Graduate School, and after the required \$50.00 residential deposit has been paid to the University. The initial residential deposit is required with the application and is held until the room or apartment is vacated. Application forms and detailed information on graduate housing will be mailed when the Graduate School has notified the Department of Housing Management of official acceptance of the student. Single women may express a choice for the type of housing desired. Completed applications for rooms and apartments are to be returned, with required deposits, to the Department of Housing Management. Assignment priority is established by the date of receipt of completed applications.

Regulations governing occupancy of rooms and apartments will be provided by the Department of Housing Management at the time application forms are forwarded to accepted students.

For the cost of housing see the section on Financial Information.

Food Services. Food service on the Woman's College Campus is cafeteria style. The dining facilities on the West Campus include one straight-line cafeteria with multiple-choice menus, a free-flow service area which includes cafeteria counters as well as a grill, and a table-service dining room. The Oak Room, where full meals and *à la carte* items are served. The Cambridge Inn, which is a self-service snack bar also located in the West Campus Union, is open from 9:00 a.m. until 12:30 a.m. each day except Saturday. All types of snack and sandwich items are available here. The Graduate Center has a cafeteria open at meal hours, and a coffee lounge which is open until 11:00 p.m. Because of the large number of those served in the dining halls, it is not possible to arrange special diets for individual students.

The cost of meals approximates \$2.50 to \$3.25 per day, depending upon the needs and tastes of the individual.

Services Available

Medical Care. The complete medical facilities of the Duke University Medical Center are available to all members of the University community. To secure the benefits of the Student Health program, a graduate student during the term or semester in which the illness occurs must (1) in the summer session term be registered for at least 1 unit of research or 3 units of course work, (2) prior to completing minimum residence requirements be registered for at least 9 units per semester and thereafter as long as full-time status is maintained. (See the section on Residence.) Students are not covered during vacations and their dependents and members of their family are not covered at any time. Care is provided for all students at the Student Health Office located in the Marshall I. Pickens Rehabilitation Center on Erwin Road.

The service provided includes hospitalization in Duke Hospital, when recommended by the Hospital staff, to a limit of thirty days in the fall and spring semesters—six days in the summer session; medical and surgical care under the supervision of a senior physician or surgeon; drugs, X-ray work, and ward nursing. Students pay for board while in the hospital. Excluded from the service are refraction of eyes, treatment of teeth and all chronic and pre-existing conditions, and elective surgery. Coverage and services can be changed without notice as deemed necessary by the University in terms of costs and usage.

Off-campus injuries and accidents are not covered by Student Health. Graduate students are urged to carry adequate health insurance to supplement Student Health program services. If students have insurance providing hospitalization, surgical, or medical benefits, the benefits shall be applied to the cost of their medical care.

Students whose course load entitles them to full coverage under the Student Health program are eligible for a complementary insurance policy which then comprises protection for the entire calendar year. Information concerning this complementary policy may be obtained from the Dean of the Graduate School. Foreign students are required to hold this or another acceptable policy.

The Duke University Counseling Center. Through the Counseling Center, the University provides a professional counseling service designed to aid students in gaining a better understanding of themselves and the opportunities available to them. Counseling is available in the areas of career planning, educational opportunities, and personal and social adjustment.

The center maintains files of educational and vocational information related to career planning, graduate educational programs and fellowships, and study aids.

National and University-wide testing programs are administered by the center. A continuing program of research in the areas of counseling and testing is also carried on by the staff of the center.

Office of Placement Services. Duke University maintains an Office of Placement Services which acts as a liaison between the University and potential employers in business and industry, education, and government. All services are offered without charge to Duke students and alumni. The staff is available to talk with graduate students about their future professional plans. Graduate students who wish to register with the office are offered an opportunity to assemble a complete dossier of academic records and recommendations to supplement applications for positions and to have a permanent file for future reference. Pertinent recommendations are far easier to accumulate during the time a student is enrolled at Duke. Interviews with representatives visiting Duke are scheduled throughout the year through the Office of Placement Services for those students who have registered.

Student Activities

Graduate students new to Duke University are welcomed to use such recreational facilities as swimming pools, tennis courts, golf course, and to affiliate with choral, dance, drama, music, and religious groups. They may become junior mem-

bers of the American Association of University Professors and may affiliate with Phi Beta Kappa and social fraternities. Wives of graduate students may join the very active Graduate Wives Club.

A full program of co-curricular and recreational activities is presented by the University Religious Council, Y.M.C.A., Y.W.C.A., Duke University Union, student government organizations, and recreational clubs. Most programs are open to the entire University community. Inquiries should be directed to the Student Activities Office, 210 Flowers Building, the Office of Cultural Affairs, 107 Flowers Building, or the Duke University Union, 209 Flowers Building.

The Information Center, Page Box Office, publications offices, art gallery, meeting rooms, lounges, and recreational facilities are located in the Flowers and Union Buildings.

Graduate Student Association. The Graduate Student Association provides a formal means of communication between the graduate student body and the faculty and administration. Membership in the association is open to all registered graduate students. This student-organized association meets monthly, with representatives present from the graduate enrollment of each department. The association is governed by a steering committee elected annually from the membership. In addition to other functions, the association provides graduate student representation on many campus committees such as those concerning the library, housing, and governance.

Research and Publications

The several departments of the University are devoted to research as well as to instruction. Since the University exists for the promotion and diffusion of



knowledge, attention is rightly placed in the Graduate School on research activities.

To further the University's obligation to promote and diffuse knowledge, the President annually appoints a University Council on Research, which receives applications from members of the various faculties for subsidies in support of research. Vigorous and forward-looking policies of this Research Council have initiated and encouraged the completion of many substantial and important research projects.

The Duke University Press is a significant agency in the diffusion of completed research. Created in 1925 as a successor to the Trinity College Press, the Duke University Press continued the publication of the *South Atlantic Quarterly*, published at Trinity College since 1902, and in 1926 it revived the *Hispanic-American Historical Review*, which had been founded and published from 1918 to 1922 by a group of scholars interested in Hispanic America. In 1929 *American Literature* was begun with the cooperation of the American Literature Group of the Modern Language Association. This journal was followed in 1931 by *Ecological Monographs*, and in 1932 by *Character and Personality* (since 1945 entitled the *Journal of Personality*). In 1935 the press began the publication of the *Duke Mathematical Journal*. Since 1948 it has published *Ecology*, the official journal of the Ecological Society of America. In 1965 it began annual publication of *American Literary Scholarship*, in 1969 the *History of Political Economy*, and in 1971 *The Journal of Medieval and Renaissance Studies*.

Since its organization the press has published over five hundred volumes. Included among these are five series: the Duke Historical Publications, the Duke Studies in Religion, the publications of the Lilly Endowment Research Program in Christianity and Politics, those of the Program in Comparative Studies on Southern Asia, and, largest of all with thirty-eight volumes, the publications of the Duke University Center for Commonwealth Studies. In the broadest sense, the policy of the Press is to make available to the public any scholarly work that merits publication, though special attention is given to works in fields of knowledge cultivated by the University.

The Law School of Duke University publishes *Law and Contemporary Problems*, *The Duke Law Journal*, and *The Journal of Legal Education*.

Visiting Scholars

The libraries and other facilities of Duke University are, to the extent practicable, made available to faculty members of other colleges and universities who wish to spend a period of time on the campus in pursuit of their scholarly interests. A special identification card is furnished a visiting scholar by the Graduate School Office. No fees are charged such visitors unless they wish to participate in activities for which a special fee is assessed. Assistance in locating residence may be obtained from the Department of Housing Management. Inquiries pertaining to visiting scholars should be directed to the individual department chairman or to the Dean of the Graduate School.



5

Admission

Students Requiring Admission

Admission is required of (1) all students who intend to pursue study toward a degree offered by the Graduate School, (2) all other students who desire credit for whatever purpose for graduate courses—except students who register as Special Students in the summer session. Students who have discontinued a program of study after earning a master's degree here must by letter request permission of the Dean to undertake a doctoral program. All applicants will be considered without regard to race, color, religion, sex, or national origin.

Prerequisites

A student seeking admission to the Graduate School of Duke University must have received an A.B. or B.S. degree (or the equivalent in the case of foreign students) from an accredited institution. His undergraduate program should be well rounded and of such quality as to give positive evidence of capacity for graduate study. Normally he should have majored in the area of his intended graduate study. Many departments (see Courses of Instruction) list specific prerequisites. Students are urged to anticipate the language requirement and are reminded that Educational Testing Service Graduate School Foreign Language tests in French, German, Russian, and Spanish are offered to undergraduate and graduate students at many centers on nationally uniform dates (see Language Requirements).

Procedures

A student seeking admission to the Graduate School should request the Dean of the Graduate School to send an application blank. This should be filled out com-

pletely and returned promptly. In addition the student should provide the following supporting documents: (1) two copies of a transcript or transcripts of all his undergraduate and graduate work mailed directly by the registrar to the Dean; (2) as soon as possible, two supplementary transcripts showing completion of work which was in progress when the earlier transcript was made; (3) three letters of recommendation, written on the forms provided, by persons best qualified to judge him as a prospective graduate student and mailed directly to the Dean; and (4) scores on the Graduate Record Examination, as indicated below.

All applicants except former students in the Graduate School must include the application fee of \$15.00 in check or money order payable to Duke University. Applications will not be processed unless this fee has been received.

Graduate Record Examination. Scores on the Graduate Record Examination, particularly the Aptitude Test, are strongly recommended in all departments and must be submitted if the test has been taken. Scores on the Graduate Record Examination may be requested of any applicant whose record is marginal and must be submitted by all applicants for a fellowship. *Students applying for financial aid should take the Graduate Record Examination no later than the December testing in order to meet the February 15 deadline.* Information on times and places of Graduate Record Examinations can be provided at the applicant's college or by the Educational Testing Service, Princeton, New Jersey 08540, or Berkeley, California 94704. Departments that require scores of all applicants are listed below.



Departments Requiring the Graduate Record Examination

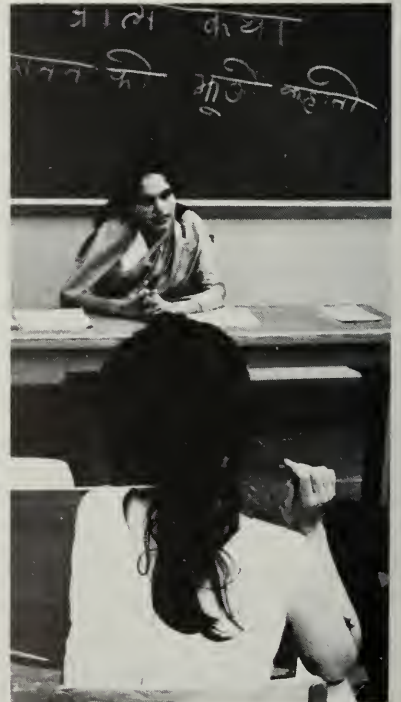
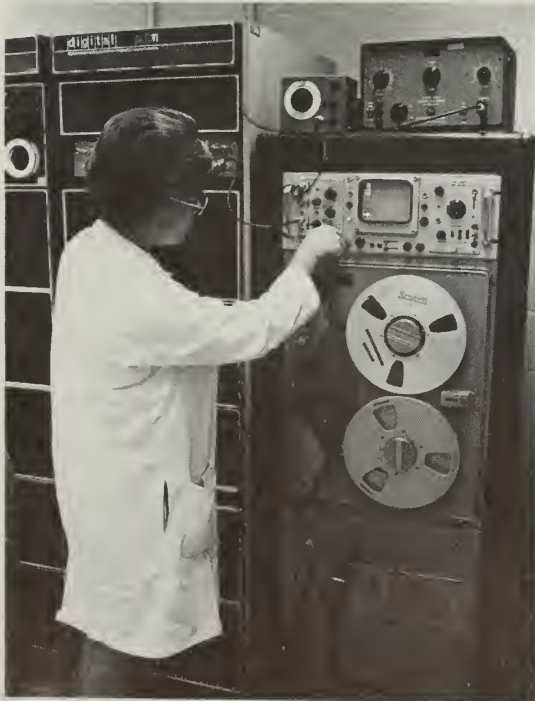
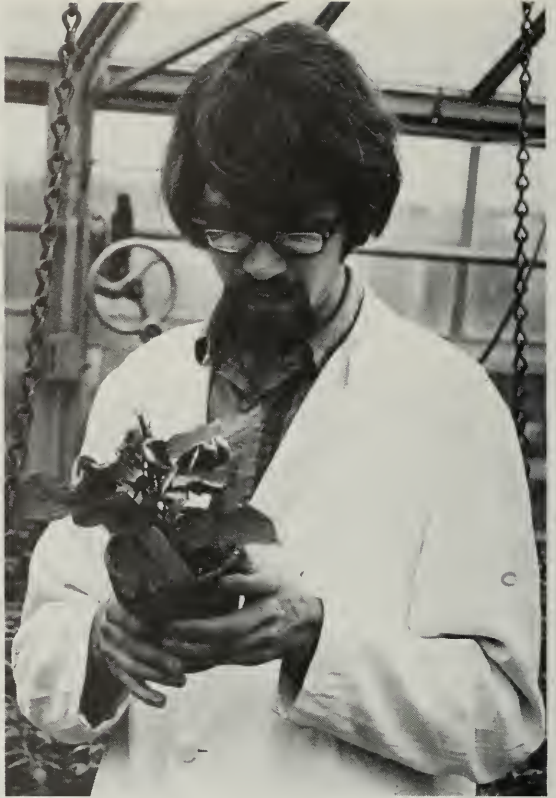
Departments	Aptitude	Advanced
Anatomy	X	
Anthropology	X	
Biochemistry	X	X
Botany	X	X
Business Administration ¹		
Chemistry	X	X
Classics	X	
Economics	X	X
English	X	X
Forestry	X	
Geology	X	
German	X	
History	X	
Mathematics	X	
Microbiology	X	X
Pathology ²	X	X
Philosophy	X	
Physical Therapy	X	
Physics	X	X
Physiology	X	X
Political Science	X	
Psychology	X	
Religion	X	
Romance Languages	X	X
Sociology	X	X
Zoology	X	X

¹ Applicants to the Graduate School of Business Administration are required to take the Admission Test for Graduate Study in Business, administered by the Educational Testing Service.

² If the candidate does not already hold a doctoral degree, he will be required to take the GRE.

Additional Procedures for Foreign Students. Fully qualified students from outside the United States are welcome to take courses in the Graduate School and, in many instances, to study toward a degree. In applying for admission the foreign student must, in addition to the information required of all students, submit with his application (1) if his native language is not English, certification of his proficiency in English demonstrated by submitting scores from the Test of English as a Foreign Language (TOEFL), administered through The Educational Testing Service in Princeton, New Jersey, or, if he is in the United States, a statement of his English proficiency written by a professor of English at his university; (2) a statement showing financial arrangements for the proposed term at Duke (estimated costs per academic year are \$3,800); and (3) a statement by a qualified medical doctor describing any emotional or physical illness the applicant has had during the previous five years. A foreign student must meet all these requirements before the Graduate School will make any offer of admission.

All foreign students whose native language is not English will be examined during their first registration period for competence in the use of oral and written



English. Until competence is determined, admission and arrangements for an award involving teaching must remain provisional. Students found to lack necessary competence will be required to enroll in the non-credit course called English for Foreign Students and to reduce their course or research program by 3 units. Tuition charge for this course will be \$36.00 per unit. A student who does not successfully complete this course during the first year of his residence will not be permitted to continue his graduate program. Passing this examination or the course, if it is required, will not meet degree requirements for a foreign language. (See Language Requirements for Foreign Students).

Notification of Status. When admission is approved, the student will receive a letter of admission and an acceptance form. The process of admission is not complete until the acceptance form has been returned.

Applicants who are admitted will be offered full admission, provisional admission, or non-degree admission. *Provisional admission* for a trial period of one semester or a minimum of 12 hours of course work is offered to students who appear to warrant admission but do not fully comply with admission requirements. *Non-degree admission* is offered to students who (1) have no intention of taking an advanced degree at Duke University but wish to take courses, or (2) do not fully meet admission requirements but wish to further their academic interests. Graduate credit earned under provisional status may be applied toward an advanced degree at Duke University if and when the student is granted full admission; graduate credit earned under non-degree status may not be applied toward an advanced degree at Duke University. (See ruling on page 2.)

Deadlines for Application. It is the applicant's responsibility to make certain that his application is completed and in order before the dates specified. Because applications cannot be reviewed until all supporting documents are filed, applications should be submitted at least *two weeks* before the closing dates listed below:

Fall semester, admission and award.....	February 15
Fall semester, admission only.....	July 15
Spring semester, admission only.....	December 1
Summer session, 1973* first term.....	May 14
Summer session, 1973* second term.....	June 18
Summer session, 1973* third term.....	July 23

Anyone whose folder is not complete before that date will face the possibility that the enrollment in his department will have been filled. While the Graduate School Office will process all applications, it will not guarantee full consideration of a folder for each department after April 15.

*Students seeking admission to the Graduate School for study in the summer session should make application to the Dean of the Graduate School as well as to the Director of the Summer Session.



6

Financial Information

Tuition and Fees

Tuition for all students for a full semester program amounts to \$1080.00 (15 units at \$72.00 per unit). Part-time tuition is calculated at the same rate of \$72.00 per unit. Tuition charges are due and payable, unless otherwise specified, at the time of registration for that semester and are subject to change without notice. Registration is not considered complete and students may not be admitted to classes until arrangements have been made with the Bursar of the University for the settlement of tuition and fees. A late registration fee of \$10.00 is charged any student not completing registration during the preregistration or registration periods. The *in absentia* fee is due on the date of registration and is subject to the late registration fee if not paid by that date. The fee is \$72.00 for 1 unit per semester.

Students passing the preliminary examination may obtain a reduction in their registration and tuition fee at any time during the five-week period beginning on registration day. No other refund in fee may be obtained. A reduction in registration may be made due to changes in departmental service requirements of assistants provided it is made during the first fourteen days after registration and is approved by the Dean. Any fee reduction for this reason is credited to future registration fees. No refund of tuition will be made after the day of registration except in the event the student involuntarily withdraws to enter the armed forces or dies during the course of the semester.

Fees incurred in connection with thesis or dissertation submission are as follows:

Binding fee, three copies of thesis or dissertation,	
other copies optional, \$5.00 per copy	\$15.00
Microfilming fee, doctoral degree only, upon final submission	\$25.00
Copyright fee (optional)	\$15.00

An athletic fee for the year of \$25.00 is optional and payable in the fall semester. The Controller of the University has sole responsibility for collection of fees and for arranging for the proration of fees.

Special Tuition Rates for Teachers and Others. The Graduate School recognizes a special obligation to encourage the following types of students in their professional and personal advancement: (1) members of the faculties and administrations of the neighboring public schools and colleges, currently engaged in *full-time* school work while taking courses in the Graduate School, (2) ministers of neighboring churches, (3) spouses of Duke faculty members, (4) *full-time* employees of Duke University who are paid on a bi-weekly or monthly basis *throughout* the year and have been employed for one year. The reduced tuition rates specified below do not apply to teachers and ministers while on leave of absence, nor to holders of fellowships, scholarships, or graduate and research assistantships, nor to part-time instructors.

Persons eligible for the reduced tuition rate must meet the admission standards required of all graduate students and must be admitted to the Graduate School. They may enroll for one or two courses per semester (in no case totaling more than 7 units) upon payment of a fee of \$5.00 for registration for each semester and tuition of \$36.00 per unit of credit or an audit fee of \$40.00 per course. Residence requirements cannot be fulfilled at the reduced rate. Students enrolled in doctoral (post-master's level) programs are not eligible for the reduced rate.

Fees for Undergraduate Courses. Graduate students registering for undergraduate courses will be assessed 3 units for a non-laboratory course and 4 units for a laboratory course.

Audit Fee. In a semester in which a student registers and pays fees for 9 units or more, he may audit one course without charge. Should he be permitted to audit a second course or should he be registered for less than 9 units, the audit fee is \$40.00 per course.

Vehicle Fee. Each student possessing or maintaining a motor vehicle at Duke University shall register it at the beginning of the academic year in the Security Office at 2010 Campus Drive. If a student acquires a motor vehicle and maintains it at Duke University after academic registration, he must register it within five (5) calendar days after operation on the campuses begins. Resident students first registering in the fall are required to pay an annual parking fee of \$30.00 for a motor vehicle and \$10.00 for a two-wheeled motor vehicle. Resident students first registering in the spring semester are required to pay a parking fee of \$15.00 for a motor vehicle and \$5.00 for a two-wheeled motor vehicle. After the mid-point of a semester, a resident student may register a motor vehicle for the remainder of that semester upon paying a fee of \$1.00 for each calendar week remaining in the semester at the time of registration. A two-wheeled motor vehicle under the same circumstances may be registered upon paying a fee of \$0.50 for each calendar week remaining in the semester at the time of registration of that vehicle.

If a motor vehicle or a two-wheeled motor vehicle is removed from the campus



permanently prior to the beginning of the spring and if the decal is returned to the Traffic Office prior to the beginning of the spring semester there will be a refund of \$15.00 for a motor vehicle and \$5.00 for a two-wheeled vehicle.

Transcript Fee. A student who wishes to obtain copies of his transcript should direct requests to the Registrar's Office. A minimum fee of one dollar, payable in advance, is charged for a single copy. A charge of fifty cents will be made for each additional copy of the same order.

Debts. No records are released and no student is considered by the faculty as a candidate for graduation until he has settled with the Bursar for all indebtedness.

Expenses

Housing. The rental charge for each person in a double room for the academic year is \$340.00 in the Graduate Center and Hanes Annex.

The rental charge for Town House Apartments is \$626.00 each for the academic year on the basis of three students to an apartment. Utility charges are included in these rates.

Rental rates are subject to change prior to the 1973-74 academic year. A \$50.00 deposit is required on all reservations.

No refund on residence hall room rent or the rent on spaces in Town House Apartments is made to students who withdraw after the date of registration, except for those who involuntarily withdraw to enter the armed services. Such refunds will be made in accordance with the University's established schedules.

For further information on housing facilities, see Living Accommodations in the chapter on Student Life.

Food. Food service, on both the Woman's College Campus and the West Campus, is described under Living Accommodations. The cost of meals approximates \$700.00 per year, depending upon the needs and tastes of the individual.

Summary. The following table represents an estimate of a graduate student's basic expenses for one academic year for a full program of work. These figures do not include allowances for recreation, travel, clothing, and other miscellaneous items which vary according to personal needs and tastes.

Tuition	\$2160.00
Room Rent (Graduate Center)	340.00
Board	700.00
Laundry	60.00
Books	120.00

Fellowships and Scholarships

James B. Duke Fellowships. The James B. Duke One Hundredth Anniversary Fund provides fellowships for students who wish to pursue a program leading to the Ph.D. degree in the Graduate School at Duke University. Its purpose is to aid in attracting and developing outstanding scholars at Duke. Selection is made by a faculty committee upon nomination by the student's department. These fellowships provide for payment of tuition for full registration plus an income stipend of \$290 per month for the first 2 calendar years and \$300 per month for the academic year during the third and final year. The award requires no service and is renewable each year upon satisfactory progress. The total value of the award is \$5,760 for each of the first two years. The total value of a James B. Duke Fellowship over the full three years of tenure is over \$14,000. There are approximately forty-five James B. Duke Fellows currently enrolled.

Endowed Fellowships. Other special endowments in addition to the James B. Duke Fund provide fellowships for graduate study. There is the Angier B. Duke Fellowship which provides for one student supported at the same level as the James B. Duke Fellowships. There are four Gurney Harris Kearns Fellowships in Religion ranging up to \$3,500. Selection for these fellowships is made through faculty committees.

Graduate Fellowships. Graduate Fellowships funded by Duke University are available to students in the departments of the Graduate School for study during the academic year. Stipends range from \$2,400 for the academic year to \$5,150 for a full calendar year. In 1971-72, there were 86 students holding these fellowships.

Federal Fellowships and Traineeships.* Duke University participates in the following federal fellowship and traineeship programs:

National Defense Education Act, Title IV Fellowships. The purpose of this program is to encourage and assist graduate students to prepare for careers as

*United States citizenship is generally a requirement for eligibility.

teachers in the nation's colleges and universities. The fellowships are three-year awards, with twelve-month stipends of \$2,400, \$2,600, and \$2,800 in the three years, plus cost of tuition and non-refundable fees. Eligible dependents receive allowances of \$500 for the year. In 1971-72 there were 84 fellowships. Nominations for these awards originate in the department of major study.

National Defense Education Act, Title VI Fellowships. The purpose of this program is to encourage persons to undertake advanced training in modern foreign languages and in related area studies not commonly taught in the United States for the purpose of developing nationwide competence in such languages and the areas in which they are spoken. The world area in which National Defense Foreign Language Fellowships are offered at Duke University is Southern Asia. In addition to pursuing the normal work toward their degree, fellows must engage during their tenure in intensive study in a language of the world area. The fellowships carry academic year stipends of \$2,000, \$2,200, or \$2,400, depending on the stage of graduate study, plus tuition and allowances of \$500 for each eligible dependent up to four. In 1971-72, four students at Duke University held NDFL Fellowships. Interested persons should obtain a separate application form from the director of graduate studies in their major department.

National Science Foundation Graduate Traineeships. Through the National Science Foundation, Duke University makes available graduate traineeships to outstanding students who intend to pursue studies in the biological, physical, and social sciences. Award benefits are stipends of \$2,400, first year level; \$2,600, intermediate level; and \$2,800, terminal year level all for twelve-month tenure. Stipends are prorated if a nine-month tenure is chosen. Benefits also include tuition and dependent's allowances of \$500. Twenty-two students held graduate traineeships in 1971-72. Nominations for traineeships originate in the department. A smaller number of summer traineeships are available to students who have been teaching assistants during the academic year.

Special Fellowships. The following special fellowships are available to qualified Duke students from sources outside the University:

Shell Fellowships in African Studies. There are available to qualified students in social sciences who are preparing for careers in the State Department, including the foreign services of the United States, the United Nations, or other international agencies, or in research and teaching in international affairs in academic institutions within the United States. They must be citizens of the United States or are, at present, residing permanently in the United States and intending to become citizens. The fellowships are intended to cover the expenses of field research in the preparation of doctoral dissertations. The stipend for each fellowship is \$4,000 plus a reasonable amount for transportation expenses. Inquiries should be made to the Executive Secretary, Center for Commonwealth Studies, Duke University.

Cokesbury Graduate Awards in College Teaching. These awards are sponsored by the Board of Education of the Methodist Church. They are designed

to assist graduate students who are committed to a Christian philosophy of higher education and who intend to teach in college. The applicant must have been a member of the Methodist Church for at least three years, and must have been accepted for, or currently be pursuing a program of graduate studies at one of the Methodist-related universities, including Duke University, approved for this program. Awards for one year vary in amount from \$500 to \$2,500. Applications must be completed before February 15. Further information and application forms may be obtained from the Dean of the Graduate School.

Exchange Fellowships with the Free University of Berlin. These fellowships are available through an exchange arrangement with the Free University of Berlin which will provide fellowships for two graduate students to work during the regular academic year in Berlin. Departments will submit nominations to the Dean of the Graduate School before February 15.

Departmental Fellowships. Various departments and schools in Duke University have fellowships which are available to students pursuing appropriate studies. Departments should be consulted for further information.

Graduate Scholarships. Graduate Scholarships funded by Duke University are available to students in the departments of the Graduate School for study during the academic year. Awards are for full or partial payment of tuition and range in value to \$2,160. In 1971-72, 31 students held Graduate Scholarships.

Summer Scholarships. A small number of Summer Scholarships which provide a payment of \$400 are available to students who are engaged in full-time study during the summer session. Interested students should consult their director of graduate studies.



Assistantships

Graduate Assistantships. Appointments as graduate assistants carry a total stipend up to \$4,350 for the academic year. The value of stipend is determined by the fraction of time given to assisting, the qualifications of the assistant, and the nature of work assigned. In 1971-72, 136 students held Graduate Assistantships.

Research Assistantships. Appointments are for predoctoral candidates whose special training and qualifications enable them to serve as assistants to individual staff members in certain departments. Stipends may be up to \$4,200, depending on the assisting time required. In 1971-72, 110 students held Research Assistantships.

Part-time Instruction. Several departments offering graduate work make use of exceptionally qualified graduate students as part-time instructors, tutors, and teaching assistants. These students are usually able to register for a graduate program of 9 units a semester.

Payment of Awards

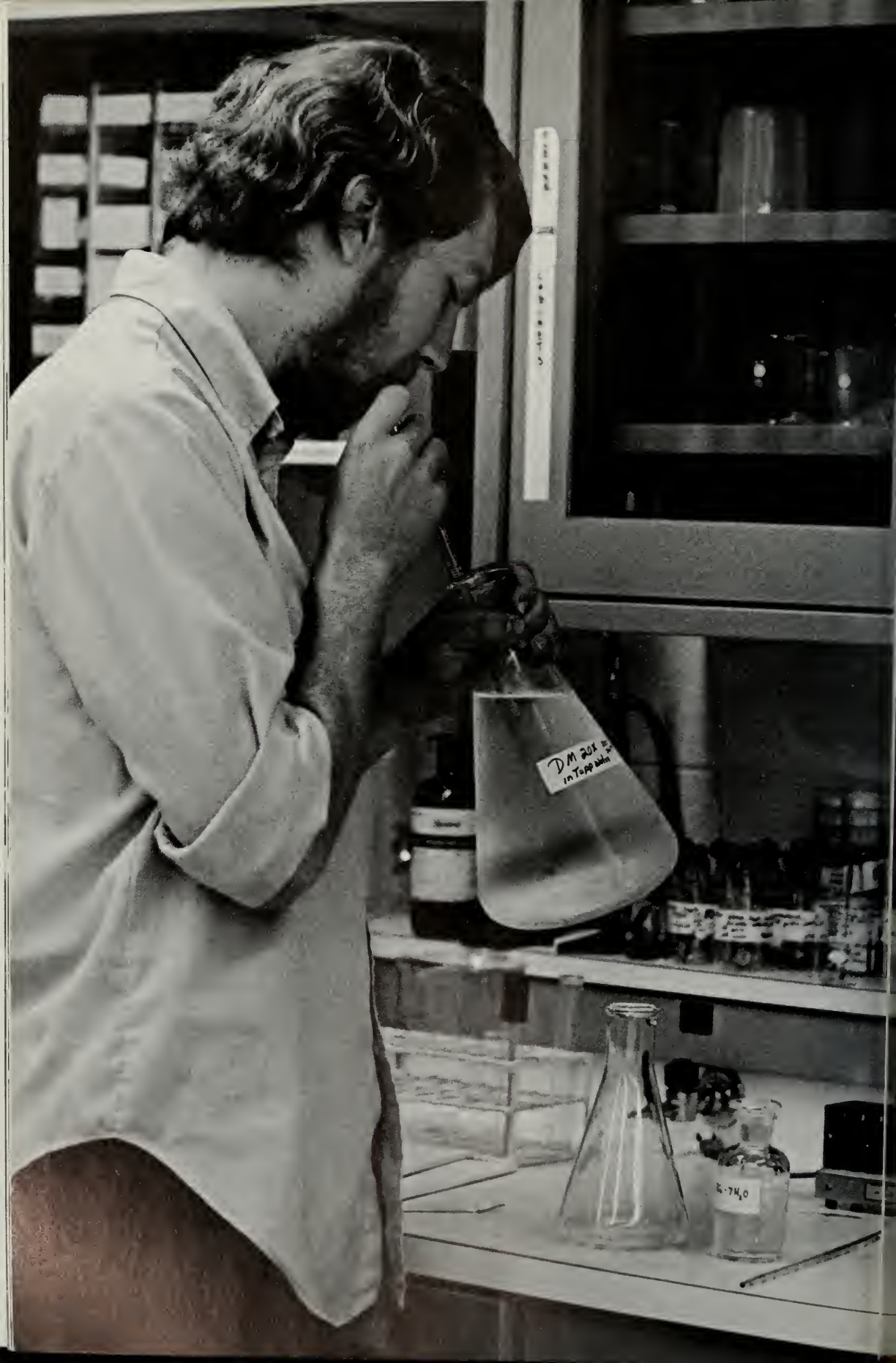
The payment of stipends to graduate students holding awards starts on September 30 and is made on the last working day of each month thereafter. The Controller of the University has sole responsibility for paying all stipends to students.

Ordinarily stipends awarded under fellowships and scholarships are not subject to income and Social Security tax. However, a portion of the award to graduate assistants and research assistants may be subject to both. The Graduate School Office will supply detailed information.

Loans

Interested students of good academic standing may apply for Duke University loans either under the National Defense Education Act or from Duke University sources. These loans usually bear lower rates of interest than commercial loans. Application should be made to Mr. W. O. Petty, Jr., 108 East Duke Building, Duke University, Durham, North Carolina 27706.

Because University loan funds are not large enough to handle the number of requests, students are encouraged to inquire concerning loan possibilities with the Higher Education Assistance Corporations in their home states, or with a lending institution near the student which may be a participant in the Federal Guaranteed Loan Program. Low interest loans under this program have provisions similar to those sponsored by the National Defense Education Act.



7

Registration and Regulations

Registration

Who Must Register. All students must register (1) who enter course work or residence for credit; (2) who have completed minimum requirements for an advanced degree, but continue to use the facilities of the University in their research; (3) who have *in absentia* status; and (4) who wish merely to audit a course or courses.

Registration Periods. After the applicant has received notification of his admission to the Graduate School and has returned his statement of acceptance of admission, he may present himself for registration. During the registration periods, announced in this *Bulletin*, he first confers with the director of graduate studies of his major department, who prepares and signs a course card, listing the course work to be taken during the semester. The student then presents this course card to registration officials, who enroll him in his courses. After his first registration period as a current student, he will preregister for subsequent semesters at the stated times for preregistration. Failure to preregister incurs the penalty for late registration. *Former students* who intend to register to resume a degree program must give the department and the Dean notice of this intention two months before registration.

Late Registration. All students are expected to register or preregister at the times stated in this *Bulletin*. Those registering late, including those who are obliged to register *in absentia*, are subject to a late registration fee of \$10.00.

Change of Registration. During the academic year within a period of *fourteen days* from the day of registration, registration may be changed with the ap-

proval of the director of graduate studies if no reduction in fee is entailed, or, if fees are to be refunded, only with the approval of the Dean. A period of five weeks from the date of registration is provided for changes resulting from passing a preliminary examination. During the first thirty days from the registration date, the only permissible change is dropping course-seminar registration and adding equivalent units of research, with the approval of the director of graduate studies, the instructor of the course, and the Dean.

Academic Regulations

Residence.* Although ideally, graduate study consists principally of individual reading, research, and laboratory experimentation under guidance, academic progress in the United States is generally measured and recorded in terms of course hours and credits. Credit for courses and seminars, research, and residence, and corresponding tuition and fees are stated in terms of units. One unit is equivalent to one semester hour. The term *residence* designates full-time study and research in close proximity to the facilities provided, as opposed to part-time study incidental to a full-time occupation. For purposes of satisfying the residence requirement of the various degrees, residence of one year is defined as two successive academic semesters of no less than 9 units registration each semester. (See the chapter on Graduate Study in the Summer Session for residence required of master's candidates engaged solely in summer study.)

Course Load. A graduate student is considered fully registered when he enrolls for the number of credits his program requires. Required registration is set in consideration of the student's obligation to teach or assist and the stage he has reached in fulfilling his degree requirements. In the academic year normal registration for the *resident doctoral* student who does not hold an appointment as part-time instructor or assistant or does not engage in part-time work is 15 units a semester or 30 units an academic year. The normal registration for the *resident doctoral* student who holds such an appointment or undertakes such work is either 12 units or a minimum of 9 units, depending upon the number of hours a week he is required to devote to such duties. The resident doctoral student carries such normal registration through the semester in which he passes the preliminary examination. If he remains in residence, he continues to register for a minimum of 3 units a semester until the dissertation is accepted. If he elects to go out of residence, he registers for 1 unit a semester *in absentia* in order to keep his program active.

The resident student engaged in a master's program requiring a thesis registers as though he were a resident doctoral student. However, once he has completed all requirements except the thesis, he may reduce his registration to 3 units per semester. If he decides to go out of residence, he registers for 1 unit *in absentia*. Regulations pertaining to a resident student engaged in a master's program requiring no thesis are identical to those described above for the doctoral student up to and including the semester in which his course requirements are satisfied. At that point, he may reduce his registration to the number of hours necessary for completion of his degree program.

*See also section on Program Information.

In each term of the summer session 6 units is maximum registration. Students who are in residence during the academic year and wish to continue study and the use of University facilities including Student Health during the summer must register for one unit in the first summer session term and one unit in the second summer session term. This registration provides use of these facilities for all three terms of the summer session.

The registration of 1 unit a semester *in absentia* provides occasional consultation with the thesis or dissertation supervisor. It may be waived for military duty or serious problems of health. Except in the semester in which a final examination is scheduled, every student is allowed two semesters of *in absentia* registration without fee provided that the student is a master's degree candidate who has completed his course and language requirements or is a doctoral candidate who has passed his preliminary examination. The student qualifying must register at the proper time each semester as *in absentia-no fee*. The student who takes advantage of this provision while completing a master's program may not again use it should he proceed into a doctoral program.

It is necessary to be a fully registered student according to the regulations listed above in order to establish eligibility for library carrel and laboratory space, student housing, University and some outside loans, Student Health service (including accident and sickness insurance; see page 40).

Credits. The following regulations pertain to credits earned outside of the Duke University Graduate School:

Graduate Credit Earned before the A.B. Degree is Granted. Ordinarily no credit will be allowed for graduate courses taken before a student has been awarded his A.B. or B.S. degree. However, an undergraduate student at Duke University, who at the beginning of his final semester lacks no more than 9 semester hours of fulfilling the requirements for the A.B. or B.S. degree, may obtain permission from the Dean of the Graduate School to enroll for graduate courses sufficient to bring his total program to 15 hours a week. Such graduate courses will be credited toward the A.M., M.S., M.B.A., M.Ed., or M.A.T. degree, provided that the student meets the requirements for admission to the Graduate School, and that he is duly registered in the Graduate School at the beginning of the semester in which he intends to earn graduate credit.

Transfer of Graduate Credits. Credit for graduate course work earned at another institution will be determined only after a student has spent one semester at Duke University. After completing his first semester, the student should file a request, approved by his director of graduate studies, that his credits be reviewed and a decision be made.

Graduate Credit for Courses Taken in the School of Law. Upon the recommendation of the director of graduate studies, and upon the approval of the Dean of the Graduate School, students in the social sciences may take certain courses in the School of Law for graduate credit. In some instances courses in the School of Law may be considered as fulfilling a student's requirements for a minor. To register for such courses, the student should present a letter from his director

of graduate studies to the Dean of the School of Law requesting permission to register for certain specified courses.

Reciprocal Agreements with the Consolidated University of North Carolina and with North Carolina Central University. Under a plan of cooperation between the Consolidated University School of North Carolina and Duke University, students regularly enrolled in the Graduate School of Duke University during the regular academic year, and paying full fees to this institution, may be admitted to a maximum of two courses per semester in the graduate schools of the Consolidated University of North Carolina or North Carolina Central University in Durham. Such students are required to pay a nominal registration fee of \$2.00 and any other special fees regularly required of all students. Under the same arrangements, students in the graduate schools of the Consolidated University of North Carolina and North Carolina Central University may be admitted to course work at Duke University. All inter-institutional registrations involving extra-fee courses will be taken at the expense of the student and will not be considered a part of the Duke University tuition coverage.

Grades. Grades in the Graduate School are as follows: *E*, *G*, *S*, *F*, and *I*. *E* (exceptional) is the highest mark; *G* (good) and *S* (satisfactory) are the remaining passing marks; *F* (failing) is below passing; and *I* (incomplete) indicates that some portion of the student's work is lacking, *for an acceptable reason*, at the time the grades are reported. The instructor who gives an *I* for a course specifies the date by which the student must have made up the deficiency, in no case more than one calendar year from the date the course ended. If the course is not completed, the grade of *F* is normally entered upon the student's record. The grade of *Z* indicates satisfactory progress at the end of the first semester of a two-semester course. It will be changed to whatever grade is appropriate upon the completion of the course. A grade of *F* in a major course normally occasions withdrawal from a degree program not later than the end of the ensuing semester or term; a grade of *F* in a minor course occasions academic probation.

Courses Primarily for Undergraduates. Students granted provisional admission and others whose preparation is found deficient may on occasion be required as part of their program to take undergraduate courses as prerequisites to continued graduate study. Undergraduate courses thus taken and others elected by the student will carry no graduate credit.

In exceptional cases, 100-level courses *outside the major department* may be taken for graduate credit to a maximum of two one-semester courses or one year-course not exceeding a total of 8 units, when approved by the director of graduate studies in the major department and in the department in which the course is listed, and by the supervisor of the program. In order to receive credit for any such undergraduate work, the graduate student must normally earn a grade of at least *B*. Graduate students registering for undergraduate courses will be assessed 3 units for a non-laboratory course and 4 units for a laboratory course.

Withdrawal from a Course. For permissible changes during the first thirty days after the registration date, see Change of Registration. If a course is dropped

without the necessary approval, the permanent record will list the course as *Dropped Unofficially, F*. If a course is dropped after the thirty-day period, the status of the student at the time of withdrawal from the course will be determined and be indicated on the permanent record as *Withdrew Passing (W.P.)* or *Withdrew Failing (W.F.)*.

Interruption of Program and Withdrawal from the Graduate School. The University reserves the right, and matriculation by the student is a concession of this right, to request the withdrawal of any student whose academic performance at any time is not satisfactory to the University. If a student wishes for any reason to withdraw from the Graduate School, he should notify both the director of graduate studies in his major department and the Dean of the Graduate School prior to the date of his expected withdrawal. (For refunds upon withdrawal, see the section on Tuition and Fees. For withdrawal occasioned by academic failure, see above.)

Students who find it necessary to interrupt their program of study for a period longer than a summer vacation should, before departure, leave with the Graduate School Office a statement of the reason for interruption, mailing address, and expected date of return. If they are subject to registration *in absentia*, they should arrange for such registration before departure.

A foreign student who after successfully completing a minimum of one semester's graduate study must withdraw for the purpose of returning home before the completion of a graduate program may with the approval of his major department request the Dean to issue him a Certificate of Graduate Study.

Size of Classes. Classes which carry graduate credit are limited in size to thirty students. In exceptional cases this regulation may be modified, but only by permission of the Dean of the Graduate School. Courses numbered from 200 through 299 may have not only graduate students enrolled but also an unspecified number of sophomores, juniors, and seniors, provided the undergraduates have the approval of both the course instructor and the director of graduate studies. Undergraduate students are not permitted to enroll in 300-level courses.

Language Requirements. Although individual departments have the right to establish their own minimal requirements (see individual departmental headnotes in this *Bulletin*), the regulations of the Graduate School require no language for the master's degree, and, in most departments, a reading knowledge of one foreign language, ancient or modern, for the Ph.D. degree. With the special approval of the Dean and of the Executive Committee of the Graduate Faculty, the foreign language requirement for the Ph.D. may be waived in individual cases or with respect to all students in a given department, provided the department submits satisfactory evidence that a foreign language has little bearing on the major program of the students concerned. The languages normally taken are French, German, and Russian. A student may substitute for any one of these another language which has a definite relation to his degree program and for which an examination can be provided. A foreign student whose native language is not English may request that the director of graduate studies in his department ask permission of the Dean

of the Graduate School to offer English for the foreign language required in his program. (See calendar at the beginning of this *Bulletin* for the scheduled dates of the appropriate examination in English.)

To avoid unnecessary delays, prospective students should anticipate the language requirement of their degree programs. For example, students whose programs call for mastery of French, German, Russian, or Spanish are urged to take the appropriate ETS Graduate School Foreign Language test prior to registration. It should be noted, however, that at the time of the final examination in a master's program or of the preliminary examination in a doctoral program, language certificates more than six calendar years old will not be accepted toward fulfilling the language requirement.

Meeting the Requirements. The foreign language requirement may be satisfied in the following ways:

1. The student may take one of the Educational Testing Service examinations administered to undergraduate and graduate students at many national centers (including the Duke University Counseling Center). The examination may be taken no longer than six years before the preliminary examination.

2. With the permission of the Dean of the Graduate School and of the chairman of his program committee or of the director of graduate studies, the *doctoral* student may file a transcript or other certification as evidence of having passed, prior to his entrance to Duke, a comparable examination, other than an ETS test, at another graduate institution. The limitations are that (a) only one language of a doctoral requirement may be met in this way, (b) the other institution offers a doctoral program in the student's major and the examination would have met a doctoral requirement there, and (c) the examination was passed no more than five years before first registration here.

3. In a language for which ETS tests are not available, a reading examination may be arranged by the Graduate School Office and administered by a qualified examiner.

4. In special circumstances, a reading examination in any foreign language may be administered by a qualified member of the faculty under a procedure specified by a department and approved by the Dean and the Executive Committee of the Graduate Faculty.

Requirements for Foreign Students. Foreign students whose native language is not English are, during their first registration period, required to take a test for minimum competence in English. Such students, with the approval of the director of graduate studies in their major department, may request permission of the Dean of the Graduate School to substitute English for the one foreign language required in the master's or doctoral program. If permission is granted, an additional advanced-level reading test in English will be arranged. (See Admission Procedure for Foreign Students.)

Special Reading Courses. Special courses designed to assist graduate students in acquiring a reading knowledge of French or German are offered for three hours a week; French during the fall semester and occasionally also in the spring, German during the spring semester and the summer session. A student who regis-



ters for either course must reduce his normal load of graduate courses by 3 units, with no reduction in fees. No auditors are permitted in these courses at any time. Undergraduates may not enroll during the academic year but may register with permission of the Dean of the Graduate School, provided total registration permits.

Undergraduate Language Courses. Students whose programs require them to take elementary language courses numbered below 200 receive no graduate credit for the work so taken.

Standards of Conduct

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Judicial Code and Procedures. In the spring, 1971, the Graduate School Community ratified and adopted the following official judicial code and procedures:

I. Graduate School Judicial Code and Procedures

- A. A student, by accepting admission to the Graduate School of Duke University, thereby indicates his willingness to subscribe to and be governed by the rules and regulations of the University as currently in effect or, from time to time, put into effect by the appropriate authorities of the University, and he indicates his willingness to accept disciplinary action, if his behavior is adjudged to be in violation of those rules or in some way unacceptable or detrimental to the University. However, a student's position of responsibility to the authorities and the regulations of the University in no way alters or modifies the responsibilities that are his in relation to civil authorities and laws.
- B. A graduate student at Duke University stands in a primary and unique relation of responsibility to the faculty in his major department, the faculty upon whose recommendation a graduate degree will or will not be awarded to the student. In matters which involve or may affect the student's intellectual or professional life, the student is directly responsible to this department and its representatives, and such matters should primarily be handled by the department.
- C. Actions which appear to conflict with University-wide rules and regulations will fall under the jurisdiction of the University Judicial Board.
- D. A student may elect to have the Dean of the Graduate School hear matters related to the student's conduct in addition to or instead of faculty members from the student's major department, or he may elect to have such matters reviewed and judged by a judicial board instead of the Dean of the Graduate School or members of the faculty in his major department. (The constitution and procedure of the judicial board are detailed below under "The Graduate School Judicial Board.")
- E. The Director of Graduate Studies in the student's major department may request that a student's actions be reviewed by the Judicial Board or by the Dean of the Graduate School.

II. The Graduate School Judicial Board

- A. *Composition.* The Graduate School Judicial Board shall have five members, serving for a period of two years: two students selected from the student body, two members of the Graduate Faculty appointed by the Executive Committee of the Graduate School, and one Associate or Assistant Dean appointed by the Dean of the Graduate School. The Board shall elect one of its members as Chairman. The Board shall have at its service a recording secretary to keep minutes of the hearings and of the Board's actions in a permanent, confidential record book. The Board will be constituted in order to hear cases in which the accused is a student currently enrolled in the Graduate School and which have been referred to it by the Director of Graduate Studies in the student's department, by the Dean of the Graduate School, or by the student himself.
- B. *Preliminary Procedures.* If a student requests a hearing by the Judicial Board he must do so in writing, allowing its chairman at least 72 hours to convene the Board. In addition, the chairman shall not convene the Board until 72 hours after he has been asked to convene the Board.

It is the responsibility of the Chairman of the Judicial Board fully to inform its members concerning the case and the reasons the case has been referred to the Board. In addition, he shall prepare a written summary of this information for the Board, the Dean, and the student.

- C. *Procedural Safeguards for the Hearing.* The Accused has the right to challenge on the grounds of prejudice any member of the Judicial Board. If the Board decides to excuse one or more of its members for reasons given by the Accused, it shall consult with the Dean about the need for replacements.

The Accused may choose an Advisor to assist him in his defense. He may also produce witnesses (including no more than two character witnesses), introduce documents, and offer testimony in his own behalf.

A person having direct knowledge relevant to a case being heard by the Board is a material witness. The Judicial Board may request the appearance of material witnesses. The Board shall also request, upon written request of the Complainant or the Accused, the appearance of material witnesses. Witnesses shall be notified of the time, place, and purpose of their appearance.

The Accused has the right to examine the written statement of any witness relevant to his case at least 72 hours before the hearing. He has the right to be faced by any witness who has given a statement relevant to his case at the hearing if the witness's attendance can be secured.

The hearing will be conducted in private unless the Accused requests an open hearing. If any objection is raised to conducting an open hearing in any particular case, the Judicial Board shall decide the issue by majority vote. If the decision is made not to hold an open hearing, the Accused shall be informed in writing of the reasons for the decision.

The Judicial Board shall consider only the report of the chairman, documents submitted into evidence, and the testimony of witnesses at the hearing in reaching its decisions.

- D. *Conduct of the Hearing.* The hearing of any case shall begin with a reading of the charge by the chairman in the presence of the Accused. The Accused shall then plead guilty or not guilty or move to terminate or postpone the hearing. The Accused may qualify a plea, admitting guilt in part and denying it in part.

The Accused may not be questioned for more than one hour without recess.

At any time during the hearing, the Accused or the Judicial Board may move to terminate or to postpone the hearing or to qualify his plea or to modify its charge.

Pending verdict on charges (including appeal) against the Accused, his status as a student shall not be changed, nor his right to be on campus or to attend classes suspended, except that the Chancellor or Provost may impose an interim suspension upon any member of the University community who demonstrates, by his conduct, that his continued presence on the campus constitutes an immediate threat to the physical well-being or property of members of the University community or the property or orderly functioning of the University.

- E. *Sanctions and the Verdict.* The Graduate School Judicial Board shall have the power to impose the following penalties: expulsion, dismissal from the University with the recommendation that the person never be readmitted; Suspension, dismissal from the University and from participation in all University activities for a specified period of time, after which the student may apply for readmission; Disciplinary Probation, placing the student on a probationary status for a specified period of time, during which conviction for violation of any regulation may result in more serious disciplinary action; Restitution, payment for all, or a portion of property damage caused during the commission of an offense. Restitution may be imposed by itself or in addition to any of the other penalties.

The Judgment shall consist of a finding of guilty or not guilty of the charge and, when the Accused is found guilty, a statement of the punishment assessed. On all questions, including the verdict and the finding of guilty or not guilty, the Board shall be governed by a majority vote.

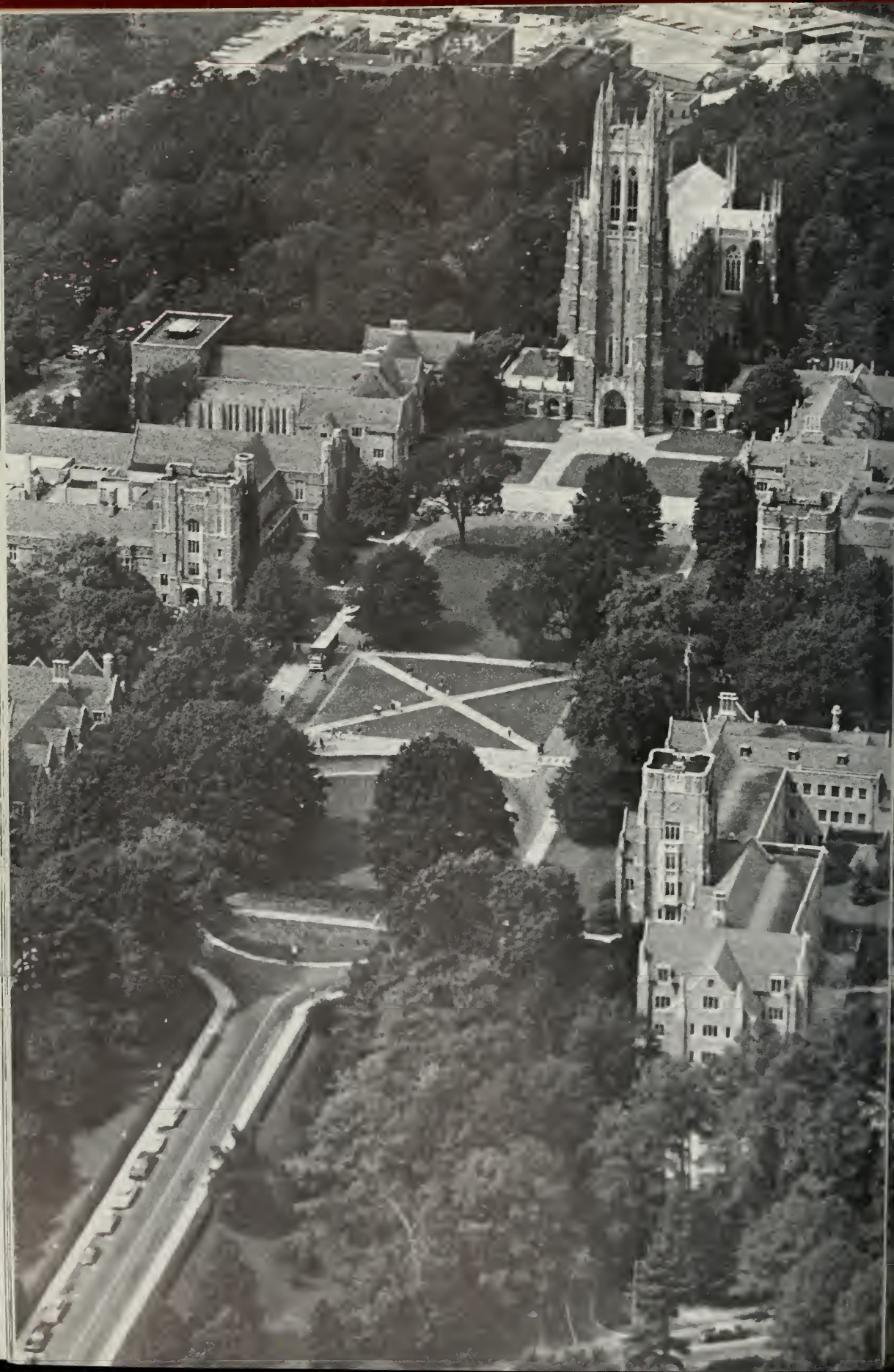
The Judicial Board may decide to rehear a case in which significant new evidence can be introduced. In addition, the defendant may request an appeal.

- F. *Appeals.* The appellant may submit to the Dean a written statement containing the grounds for his appeal and his arguments. In such cases, the Dean should determine if the appeal should be granted, and he can hear the case himself, or refer it to the appropriate faculty in the student's department or to the Judicial Board.

An appeal shall be granted on the following grounds: procedural error substantially affecting the rights of the Accused; incompatibility of the verdict with the evidence; Excessive penalty not in accord with "current community standards"; new evidence of a character directly to affect the judgment but on which the original tribunal had refused a new hearing.

III. Amendment and Construction

This Judicial Code and Procedure and this constitution and procedure for the Graduate School Judicial Board may be amended at any time with due notice or publication by consent of the Dean, the Executive Committee, and the graduate students. Questions and problems not answered or anticipated by the foregoing may be resolved by the use of other existing institutions or by amendment.



8

Graduate Study in the Summer

Programs Offered

The 1972 Summer Session of Duke University will consist of three terms. The first term will begin on May 15 and will end on June 16. The second term will begin on June 19 and will end on July 21. The third term will begin on July 24 and will end on August 25.

Graduate students who wish to work toward advanced degrees in the summer session, particularly in chemistry, economics, education, English, history, mathematics, religion, sociology, and zoology, will find a selection of courses offered by members of the Duke faculty and by visiting professors. Other departments ordinarily offering work leading to the A.M. degree are Botany, Political Science, and Psychology. Thesis research for advanced graduate students is available also in most other departments, such as Engineering, Forestry, and Physics.

Students who wish to be admitted to the Graduate School for work in the summer session should make application to the Dean of the Graduate School, as well as to the Director of the Summer Session, and should return the completed application, with supporting documents, before April 15 for admission to Term I; before May 15 for admission to Term II; and before June 15 for admission to Term III. (See the section on Admission.)

Regulations Regarding Summer Work

No graduate student may register for more than 6 units of credit in one summer session term. All of the work required for the master's degree must be completed within six years of the date of matriculation. No residence credit can be accepted toward the requirement for the Ph.D. degree for work completed during the summer sessions. Students who complete during the summer session the work required by the University for an advanced degree will be granted the degree in September.

The *Bulletin of the Summer Session* containing information about graduate courses may be obtained by writing to the Director of the Summer Session, Duke University, Durham, North Carolina 27706.



9

Courses of Instruction

Course Enrollment

In general, courses with odd numbers are offered in the fall semester, those with even numbers in the spring semester. Double numbers separated by a hyphen indicate that the course is a year course and must normally be continued throughout the year if credit is to be received. A student must secure written permission from the instructor in order to receive credit for either semester of a year course. Double numbers separated by a comma indicate that although the course is a year course, credit may be received for either semester without special permission. Normally, courses which bear no date are offered every year.

Note: In each department the number 399 is reserved to designate special (individual) readings in a specified area and supervised by a regular member of the graduate staff, with credit of one to three units each registration, only one course per registration, and nine units maximum in three successive registrations. The course is restricted to resident master's and doctoral programs, must have a completion exercise, and must carry a grade.

Anatomy

Professor Robertson, *Chairman* (401 Davison Building); Assistant Professor Adelman, *Director of Graduate Studies* (353 Bell Building); Professors Buettner-Janusch, Everett, Moses, and Peele; Associate Professors Duke, Longley, and Reedy; Assistant Professors Bergeron, Cartmill, Counce, Erickson, Hall, Jacobs, Johnson, Mahaley, and Shafland

The Department of Anatomy offers graduate programs designed to produce teachers and research workers competent in a broad range of anatomical sciences; both A.M. and Ph.D. degrees are offered. Students with a wide variety of backgrounds and interests in the biological sciences can be accommodated. All students participate in a core anatomical sciences course (Anatomy 301) and gain experience in teaching over the range of departmental interests. Students are encouraged to round out their formal course work by drawing upon the offerings of other departments in the University, as well as those in the Anatomy Department. Laboratories within the department are equipped for and actively support research in several areas. Some idea of the opportunities for degree research may be gleaned from the description of Anatomy 312. For further information contact the Director of Graduate Studies.

208. Anatomy of the Trunk. Designed for Ph.D. candidates in anatomy as well as general practitioners and specialists in surgery and internal medicine. Emphasis upon the anatomy of the thoracic, abdominal, and pelvic organs. Prerequisite: core course in anatomy. Number of students arranged by staff. 2 units. *Duke*

210. Introduction to Human Structure. Based on the dissection of a cadaver. Emphasis upon the biological and evolutionary aspects of human morphology. There is a strong emphasis upon comparative morphology in the course. Primarily open to undergraduates. Prerequisite: permission of instructor. Hours and credit by arrangement. *Shafland*

219. Molecular and Cellular Basis of Development. A multidisciplinary approach stressing the molecular, cellular, and genetic processes involved in development and differentiation in pro- and eukaryotes. Topics include: initiation of development, morphogenesis, developmental genetics, differentiation, and nuclear-cytoplasmic interactions in development. (Also listed as Biochemistry 219, Microbiology 219, Pathology 219, and Physiology 230.) 3 units. *Counce, McCarty, and Staff*

219S. Seminar. Optional seminar offered in conjunction with Anatomy 219. Students prepare and present seminar topics directly related to specific subjects discussed in Anatomy 219. Prerequisites: enrollment in Anatomy 411 and permission of instructors. 1 unit.

231. Human Evolution I. Evolutionary biology of the primates. Anatomical, behavioral, and molecular adaptations of fossil and living primates including *Homo sapiens*. Prerequisite: a course in biology or consent of instructors. (Also listed as Anthropology 231 and Zoology 131.) 3 units. *Buettner-Janusch and Cartmill*

232. Human Evolution II. Human population and biochemical genetics. Analysis of the effects of natural selection on past and present human populations. Prerequisite: Anatomy 231 (Anthropology 231, Zoology 131), consent of instructor, or a course in genetics. (Also listed as Anthropology 232 and Zoology 132.) 3 units. *Buettner-Janusch*

***233-234. Comparative Anatomy of the Primates.** Extensive readings in the literature of comparative primate anatomy and dissection of selected anthropoid

*Not offered 1972-73.

and prosimian primates. Particular attention to locomotor functions and cranial morphology. Students are encouraged to develop intensively some topic conforming to their own research interests. Prerequisite: Anatomy 301 or consent of the instructor. 3 units per semester. *Cartmill*

236. Human Genetics. Particular emphasis upon the uniqueness of studies in human biochemical and population in genetics. Prerequisite: Anatomy 231 (Anthropology 231, Zoology 131), or an elementary course in biology including genetics, or permission of instructor. (Also listed as Anthropology 236 and Zoology 236 and under the University Program in Genetics.) 3 units. *Buettner-Janusch*

238. Functional and Evolutionary Morphology of Primates. History and functional significance of locomotor and feeding adaptations, craniofacial morphology, sense organs, and reproductive systems in primates, including *Homo sapiens*. Prerequisites: Anatomy 231 (Anthropology 231, Zoology 131) or equivalent, or consent of instructor. 3 units. *Cartmill*

244. Topics in Cell Structure and Function. Advanced discussions of selected problems such as chromosome structure, mitosis, and cytological aspects of inheritance and development. Prerequisites: Zoology 243 (Botany 243) or equivalent and permission of instructor. (Alternates with Anatomy 288 and Zoology 288.) (Also listed as Zoology 244). Offered spring, 1974 and alternate years thereafter. 2 units. *Moses and Nicklas*

261. History of Generation and Mammalian Reproduction. Discussion of theories of generation and of historical development of present-day concept of mammalian reproductive processes. Prerequisite: consent of instructor. Offered fall, 1973 and alternate years thereafter. (Alternates with Anatomy 263.) 1 unit. *Duke*

263. History of Anatomy. Discussion of the lives and contributions of the founders of anatomy, from Aristotle to the twentieth century. Prerequisite: consent of instructor. Offered fall, 1972 and alternate years thereafter. (Alternates with Anatomy 261.) 1 unit. *Duke*

264. Mammalian Embryology and Developmental Anatomy. Study of early embryology and organology of mammals, using the rat as the basic form, supplementing it with other mammalian forms, including primates. Prerequisites: one year of zoology and consent of instructor. 4 units. *Duke*

271. Comparative Neurology and Psychology. Variations among brains of different vertebrate species will be correlated with genetic lines of descent and the behavioral requirements of different habitats. Prerequisite: permission of instructor. (Also listed as Psychology 271.5.) 3 units. *Hall*

280. Molecular Basis of Anatomy. Lectures and conferences on the molecular structure of biological macromolecules and their organized aggregates such as are found in viruses, muscles, membranes, and other intracellular organelles, with emphasis on the results of electron microscopy, X-ray diffraction, and optical analysis. Prerequisites: microscopic anatomy or cytology (or equivalent) and permission of instructor. Offered spring, 1973 and alternate years thereafter. (Al-

ternates with Anatomy 286.) 3 units. *Longley, Adelman, Erickson, Moses, Reedy, and Robertson*

***284. Tutorial in Developmental Biology.** Reading and discussion program to be arranged to suit the individual student's interests in the field. Prerequisite: permission of instructor. Limit: 5. Credit variable. *Counce*

286. Optical Methods in Biophysical Cytology. Theory and application of biophysical techniques for investigating cell structure and function: fundamentals of optics; qualitative and quantitative analysis using ordinary, ultraviolet, phase, interference, polarization, and fluorescence microscopy, and transmission and scanning electron microscopy; optical, electron, and X-ray diffraction; autoradiography. Prerequisites: microscopic anatomy or cytology (or equivalent), calculus and one year each of physics and general chemistry; permission of instructor. Offered spring, 1974 and alternate years thereafter. (Alternates with Anatomy 280.) 3 units. *Longley, Erickson, Moses, Reedy, and Robertson*

***288. The Cell in Development and Heredity.** A seminar on topics of current interest and controversy. Prerequisites: a course in genetics and permission of instructor. (Alternates with Anatomy 244 and Zoology 244.) (Also listed as Zoology 288 and under the University Program in Genetics.) 2 units. *Counce*

290. Membrane Structure. Theories of membrane structure and history of their development; physical and chemical structure of membranes; lipid-protein, and lipo-protein models. Electron microscopic, X-ray diffraction, and polarization optical studies of membrane structure considered in detail. Enrollment: minimum 5. 1 unit. *Robertson*

291. Special Topics in Nerve Ultrastructure. Each student chooses a topic, such as ultrastructure of synapses, or sensory nerve endings including the retina, of auditory nerve, of simple nerve nets, or morphological correlates of learning. Each student pursues his topic in the library during the first half of the semester with guidance from the instructor in order to prepare a detailed paper. The second half of the semester is devoted to seminar presentations and discussions of the selected topics. Enrollment: minimum 5. 2 units. *Robertson*

300. Gross Anatomy. Gross anatomy for physical therapy students. Credit to be arranged; maximum—8 units. *Jacobs and Staff*

301. Gross Human Anatomy, Microscopic Anatomy, and Neuroanatomy. Gross anatomy includes complete dissection of a cadaver; laboratory work is supplemented by conferences which place emphasis upon biological and evolutionary aspects. Microscopic anatomy will emphasize the cell, its generalized structural and functional organization down to the molecular level, and differentiations of the cell in various organs and tissues. Students will be introduced to light and electron microscopic and diffraction methods for investigating biological structure. Neuroanatomy will first present the gross and basic intrinsic anatomy of the central nervous system. Later, specific systems will be emphasized: various sensory and motor; limbic-hypothalamic; and cerebral-associated mechanisms. Clinical presentations will be offered. Prerequisites: adequate background in biology, including

*Not offered spring, 1973.

comparative anatomy and embryology, and permission of the Director of Graduate Studies. Required of entering graduate students in Anatomy; by arrangement, may extend into second semester. Hours and credit by arrangement; maximum—8 units.
Staff

303. Neuroanatomical Basis of Behavior. A study of the gross and microscopic anatomy of the nervous system with emphasis on the structural and functional relationship between tracts, nuclei, and cortical areas. 3 units. *Hall and Peele*

312. Research. Individual investigations in the various fields of anatomy. Laboratories in which a student may work include: three electron microscopy laboratories headed by Moses, Reedy, and Robertson with emphasis respectively on the fine structure and cell biology of chromosomes and associated structures, molecular structure and function of muscle, and biophysical studies of the cell membrane and nervous tissue; physical anthropology laboratory and Primate Facility, under Buettner-Janusch, Bergeron, and Cartmill, concentrating on molecular genetics, cytogenetics, comparative anatomy, and primate evolution and behavior; neuroanatomy laboratories under Peele and Hall emphasizing structural correlates of behavior and learning; a neuroendocrinology laboratory under Everett with emphasis on brain mechanisms regulating reproductive functions of the pituitary gland; a human reproduction laboratory under Duke studying ovarian structure and function; developmental biology laboratories under Counce and Johnson with strong emphasis on insect and amphibian morphogenesis and the relationships of cell membrane contact phenomena to differentiation; a cell biology laboratory under Adelman, emphasizing biochemical aspects of primitive motility and the structure and function of membranes; a comparative anatomy laboratory under Shaffland studying feeding mechanisms in lower vertebrates; and molecular structure laboratories under Erickson and Longley using a combination of electron microscopy, X-ray diffraction, and optical and computer methods of image analysis. Credits to be arranged. Permission of staff required. *Staff*

313-314. Anatomy Seminar. Regular meeting of graduate students and staff in which current research problems in anatomy will be presented. 1 unit per semester. *Staff*

333. Primate Evolution. Phylogeny of the order Primates, inferred from the fossil record, from molecular biology, and comparative anatomy of living primate populations. Hominid paleontology. Prerequisite: consent of instructor. (Also listed as Anthropology 333 and Zoology 333.) 3 units. *Buettner-Janusch and Cartmill*

334. Topics in Physical Anthropology. Reading and discussion of recent research. Prerequisite: Anatomy 333 (Anthropology 333 and Zoology 333). (Also listed as Anthropology 334 and Zoology 334.) 3 units. *Cartmill and Buettner-Janusch*

340. Tutorial in Advanced Anatomy. Topics for intensive reading and discussion will be chosen according to the student's interests, related to basic problems in biophysics, cytology, endocrinological control, growth and development, neuroanatomy, physical differentiation, and evolutionary origins of functional micro-

systems. Maximum enrollment: 8. Prerequisite: permission of instructor. 3 units. *Staff*

344. Advanced Neuroanatomy of Sensory and Motor Mechanisms. The course will involve consideration of classic and modern concepts of somatic and special sensory systems and of somatic and visceral motor systems. Clinical correlations of basic neuroanatomy will be included. Minimum enrollment: 5; maximum: 20. 3 units. *Peele*

354. Research Techniques in Anatomy. A preceptorial course in various research methods in anatomy. An interested student might engage in research in one of the following: anthropology, electron microscopy, developmental biology, fetal physiology, primate behavior, primate anatomy, and stereotactic approaches to neuroendocrinology and neuroanatomy. Other topics may be arranged. Prerequisite: permission of instructor. Units to be arranged. *Staff*

403. Endocrinology and Reproduction. Current concepts of biosynthesis, secretion and mechanism of action of hormones. Structure and function of male and female reproductive systems, including hormonal mechanisms in pregnancy and parturition. (Also listed as Physiology and Pharmacology 403.) 3 units. *Everett, Anderson, and Fellows*

Art

Professor Covi, *Chairman*; Professor Markman, *Director of Graduate Studies*; Professors Hall, Heckscher, and Sunderland; Lecturer Langedijk

A graduate program in art history leading to the A.M. degree has recently been approved. For further information, please consult the Director of Graduate Studies.

217. Aegean Art. A study of the problems of Aegean art as the forerunner of Greek art and in relation to the contemporary civilization of the eastern Mediterranean world. 2 units. *Markman*

218. Early Greek Art. A study of the problems of the origin and development of Greek art in the Geometric period to the end of the Archaic. 3 units. *Markman*

***233. Early Mediaeval Architecture.** The development of religious architecture from the time of Constantine to the end of the First Romanesque style in the third quarter of the eleventh century. 3 units. *Sunderland*

***234. Romanesque Sculpture.** The development of sculpture in Western Europe from the early Christian period through the culmination of Romanesque art in the west portal of Chartres Cathedral. 3 units. *Sunderland*

239. Architecture of Britain. A summary of recent archaeological activity in the British Isles and a survey of mediaeval building, the course deals principally with changing architectural problems and their solutions from the advent of the Renaissance onward. Attention is given to the interests of students majoring in history or literature. 3 units. *Hall*

*Offered on demand.

240. Architecture of North America. A study illustrating the transplantation of European architectural customs since the sixteenth century; the time-lag in transit and acceptance of later European developments; the gradual assumption of confident independence in design; and the emergence of international leaders in the United States. 3 units. *Hall*

241. Problems in Latin American Art. The architecture, painting, sculpture, and other arts with the emphasis on colonial architecture of Central America. Open to students who have a reading knowledge of Spanish and/or have had courses in Latin American history, economics, or literature. 3 units. *Markman*

251-252. Research. A course designed to give instruction in methods used in the investigation of original problems. Open to seniors by permission of the Director of Undergraduate Studies. 6 units. *Heckscher*

253. Studies in Italian Renaissance Sculpture. 3 units. *Covi*

254. The Art of Andrea del Verrocchio and its Influence. 3 units. *Covi*

255, 256. Iconological Problems. Study of subject matter and sources. 3 units per semester. *Langedijk*

291-292. Museology Seminar. This course will deal with most aspects of the operation of a museum. In particular, participants will be instructed in exhibition and restoration techniques, registration of art objects as well as researching them with a view to a final exhibition accompanied by a scholarly catalogue. Prerequisites: undergraduate art major or consent of the professor. 2 units. *Heckscher and Staff*

Asian Languages

The course is offered as an enrichment for students interested in the South Asian subcontinent and may be taken as a general elective by advanced undergraduate students. No major work is offered in Hindi-Urdu.

Hindi-Urdu 200-201. Special Studies in South Asian Languages. Intensive concentration in advanced Hindi reading and conversation, or specialized graded work in cognate South Asian languages necessary for the advanced student contemplating field work in South Asia. Prerequisite: consent of instructor. 6 units. *Staff*

For offerings in Chinese and Japanese, see *Bulletin of Undergraduate Instruction*.

Biochemistry

Professor Hill, *Chairman* (Medical Sciences Building); Professor Gross, *Director of the Genetics Division* (Medical Sciences Building); Professor McCarty, *Director of Graduate Studies* (Medical Sciences Building); Professors Bernheim, Fridovich, Guild Handler,* Kamin, Kirscher, McCarty, and Tanford; As-

*On leave of absence.

sociate Professors Appel, Harris, Kaufman, Lynn, and Webster; Assistant Professors Greene, Habig, Hall, Harriman, Kelley, Kim, Kredich, McKee, Rajagopalan, Reynolds, Richardson, Sage, Siegel, Sullivan, and Wheat; Associates Bittikofer and Nozaki

Graduate work in the Department of Biochemistry is offered leading to the Ph.D. degree. Preparation for such graduate study may take diverse forms. Undergraduate majors in chemistry biology, mathematics, or physics are welcomed, but adequate preparation in chemistry is essential. Graduate specialization areas include protein structure and synthesis, enzyme action, and metabolism. The Division of Genetics of the department, in cooperation with the University Program in Genetics, offers biochemistry students the opportunity to pursue advanced research and study to fulfill the requirements for the Ph.D. degree.

204. Introductory Genetics. An introduction to genetic analysis with emphasis on the molecular basis of mutation, segregation, function, and organization of the genetic material. Primarily for medical students, but graduate students may be admitted with the instructor's permission. (Also listed under the University Program in Genetics.) 3 units. *Gross and Others of the University Program in Genetics*

208. Laboratory Methods in Biochemistry. An advanced laboratory course that emphasizes current procedures, instrumentation, and experiments. Each student selects from a number of experiments of a wide range of classical investigations that illustrate significant biochemical progress. Prerequisites: Biochemistry 293, 295, and 297, or equivalent. Offered only in the summer. 2 units. *Staff*

209-210. Independent Study. A tutorial designed for students who are interested in either a laboratory or a library project in biochemistry. Units to be determined. *Staff*

216. Molecular Genetics. An advanced course on genetic mechanisms and their relationship to nucleic acids. Prerequisites: introductory courses in biochemistry and genetics. (Also listed under the University Program in Genetics.) 3 units. *Guild and Others of the University Program in Genetics*

219. Molecular and Cellular Basis of Development. See course description for Anatomy 219. (Also listed as Anatomy 219, Microbiology 219, Pathology 219, and Physiology 230.)

219S. Seminar. Optional seminar offered in conjunction with Biochemistry 219.

222. Protein Crystallography. Introduction to the techniques of structure determination by single-crystal X-ray crystallography and study of some macromolecules whose three-dimensional structures have been determined at high resolution. 2 units. *Kim and Richardson*

241. General Biochemistry. An introductory survey of fundamental aspects of biochemistry with emphasis on the structure of macromolecules, mechanism of enzyme action, metabolic pathways, biochemical genetics, and the structure and functions of special tissues. Intended primarily for medical students, but

available also for graduate students who cannot register for Biochemistry 247 in the spring semester. 4 units *Staff*

247. Introductory Biochemistry. The chemistry of proteins, lipids, carbohydrates, and nucleic acids and the metabolic interrelationships of these compounds. The biochemical basis of photosynthesis, genetics, vision, nutrition, nerve conduction, and muscle contraction will also be considered. Prerequisites: Chemistry 151, one year of college physics (second semester may be concurrent), Mathematics 22, or consent of the instructors. This course is acceptable in partial fulfillment of the departmental major requirements in biochemistry, botany, chemistry, and zoology. (Listed also as Zoology 248.) 3 units. *Tanford and Staff*

276. Comparative and Evolutionary Biochemistry. Lectures and discussion of the origin of life, evolution of the genetic code, mutation and protein polymorphism, natural selection, and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Techniques used include salt fractionation, electrophoresis, ion-exchange and molecular exclusion chromatography, fingerprinting, molecular weight determination, amino acid composition, and other related approaches. Prerequisite: consent of the instructor. (Also listed as Zoology 276.) (Given at Beaufort.) 6 units. *Sullivan*

280. Biochemistry of Development. Current concepts on control mechanisms in embryonic development and differentiation discussed at the cellular, biochemical, and molecular level. (Also listed as Microbiology 251.) *Harris, Joklik, McCarty, and Turkington*

282. Experimental Genetics. A series of laboratory exercises and discussions on the molecular mechanisms of mutation, recombination, replication, transcription, and translation of the genetic material. May be taken concurrently with Genetics 280. Prerequisite: consent of instructor. (Also listed under the University Program in Genetics.) 2 units. *Harriman and Others of the University Program in Genetics*

284. Current Topics in Genetic Mechanisms. A seminar and lecture course devoted to the analysis of the current literature in molecular genetics. Given in response to adequate demand. Prerequisites: Genetics 280 or its equivalent and consent of the instructor. (Also listed under the University Program in Genetics.) 1 unit. *Hall and Others of the University Program in Genetics*

286. Current Topics in Immunochemistry. The structure, function, and specificity of antibodies. Immunogenicity and tolerance with special emphasis on current theories of the diversity and synthesis of antibody molecules. 2 units. *Sage*

288. The Carbohydrates and Lipids of Biological Systems. The subjects will be considered in the following two general categories: (a) the relationship between chemical structure and biological function, and (b) biosynthesis and catabolism. 2 units. *Kaufman*

290. Bioenergetics. Biological mechanisms of transduction of energy (covalent, ionic, photonic, and electric) will be considered, using photosynthetic, oxidative, phosphorylative, and glycolytic systems as examples. Since many of the

above processes occur in membranous systems, the role and function of membranes in these processes will also be considered. 2 units. *Lynn*

293. Macromolecules. The structures of biological macromolecules and their relations to biological functions. The emphasis is on proteins and enzymes. Prerequisites: physical chemistry equivalent to Chemistry 161-162. 4 units. *Hill and Tanford*

294. Nucleic Acids and Macromolecular Synthesis. Physical properties of nucleic acids in terms of covalent structure, helix, base pairing, helix-coil transitions, as well as properties that influence fractionation by techniques of column-fractionation, velocity and equilibrium centrifugation, etc., and are considered in relation to biological function. Protein nucleic acid interactions, as well as damage, repair, and mechanisms of synthesis will be reviewed. Mechanisms of RNA transcription and enzymatic alterations of preformed macromolecular structures will be illustrated by recent examples. Protein synthesis and polypeptide bond formation is considered in terms of initiation, decoding, translocation, ribosomes, termination, and release. 3 units. *McCarty and Staff*

295. Enzyme Mechanisms. A review of techniques for the purification of enzymes, thermodynamic aspects of enzyme catalysis, parameters of the activation process, and overall reactions. The number and affinities of binding sites and the identification of the residues involved in the activity of enzymes will also be considered. 2 units. *Fridovich and Rajagopalan*

296. Biological Oxidations. A lecture, conference, and seminar course which deals with the mechanism of electron transport and energy conservation in a variety of oxidative enzymes. These mechanisms will be examined both in purified enzymes and in organized systems such as the mitochondrion, the endoplasmic reticulum, and the chloroplast. 2 units. *Kamin, Fridovich, Rajagopalan, and Siegel*

297. Intermediary Metabolism. The synthesis and degradation of carbohydrates, lipids, protein, and nucleic acids will be discussed in detail with emphasis on energy transformation and metabolic interrelationships. 3 units. *Kirschner and Siegel*

298. Regulation of Cellular Metabolism. Emphasis is placed on the metabolic, hormonal, and genetic regulation of the overall metabolism of the cell. Prerequisites: Biochemistry 295, 297. 2 units. *Greene and Staff*

345, 346. Biochemistry Seminar. Required of all biochemistry students. 1 unit per semester. *Siegel and Staff*

351, 352. Genetics Seminar. Required of all students specializing in genetics. (Also listed under University Program in Genetics.) 1 unit per semester. *Gross and Others of the University Program in Genetics*

Botany

Professor Wilbur, *Chairman* (149 Biological Sciences Building); Associate Professor Strain, *Director of Graduate Studies* (136 Biological Sciences); Professors

Anderson, Billings, W. Culberson, Hellmers, Johnson, Kramer, Naylor, Philpott, and Stone; Associate Professors Searles and White; Assistant Professors Antonovics and Boynton; Lecturer C. Culberson

Graduate work in the Department of Botany is offered leading to the A.M. and Ph.D. degrees. Before undertaking graduate study in botany a student should have had in his undergraduate program at least 12 semester hours of botany beyond an elementary course, and related work in biological sciences. Some work in chemistry and physics will be desirable and, for some phases of botanical study, a necessity. Graduate Record Examination scores are required of all applicants. The student's graduate program is planned to provide a broad basic training in the various fields of botany, plus intensive specialization in the field of the research problem.

205. Anatomy. Intensive survey of vascular plant cell types, tissues, and organs, with emphasis on the modern application of anatomy to problems of systematics and phylogeny. Laboratories will include microtechnique. Special project and term paper stressing current techniques and literature required. Prerequisite: permission of instructor. 4 units. *White*

S205. Introductory Marine Microbiology. The biology of microorganisms in oceans and estuaries. Prerequisite: one year of college biological science. (Summer session only.) 6 units. *Johnson and Searles*

209. Lichenology. Morphology, systematics, and biological and ecological implications of the lichens. Collection and identification of specimens and the use of lichen chemistry in taxonomy. 3 units. *W. Culberson and C. Culberson*

210. Bryology. Morphological, systematic, and ecological characteristics of mosses and liverworts. 3 units. *Anderson*

S211. Marine Phycology. An introduction to marine algae: their identification, taxonomy, morphology, physiology, and ecology. Field trips complemented by laboratory study, culturing, and preparation of herbarium material. (Summer session only.) 6 units. *Searles*

***212. Phycology.** Morphological and ecological characteristics of common freshwater and marine algae and principles of their classification. 4 units. *Searles*

213. Survey of Modern Botany I. (Summer Session only.) 3 units. *Staff*

214. Survey of Modern Botany II. (Summer Session only.) 3 units. *Staff*

221. Mycology. Field and laboratory study of the vegetative and reproductive structures of the fungi and slime molds. Methods of collection, isolation, propagation, and identification of the major orders as represented in the local flora. Prerequisite: one year of biological science. 4 units. *Johnson*

225-226. Special Problems. Students with adequate training may do special work in the following: (1) mycology; (2) cytology, (3) ecology, (4) genetics, (5) morphology and anatomy of vascular plants, (6) bryology (7) physiology, (8) taxonomy of vascular plants, (9) bacteriology (10) lichenology, (11) phycology. Credits to be arranged. *All Members of the Graduate Faculty*

*Not offered in 1972-73.

235. Field Botany. (Summer Session only.) 3 units. *Wilbur*

242. Systematics. A general survey of the principles of vascular plant taxonomy, with practice in identification and collection. Lectures, laboratories, and field trips. Prerequisite: one year of biology. 4 units. *Wilbur*

243. Cytology. The structure and functional organization of cells. Lectures, readings, and conferences. Prerequisite: one year of botany or zoology. (Listed also as Zoology 243.) 3 units. *Anderson and Nicklas*

245. Plant Diversity. An examination of the major groups of the living plants and a consideration of their evolutionary origins and phylogenetic relationships. Prerequisite: one year of biology. 4 units. *Culberson and White*

246. Ecology. Intensive study of the environmental effects on growth and distribution of plants at the level of the individual, the population, and the ecosystem. A term paper will be required. Lectures, laboratories, and field trips. Prerequisite: permission of instructor. 4 units. *Billings and Strain*

250. Plant Biosystematics. Basic descriptive and experimental procedures for the study of vascular plant evolution. Prerequisites: Botany 52 and 55 and either Botany 243 or a course in genetics, or their equivalents. 4 units. *Stone*

251. Physiology. Physiological processes in plants and their interrelationships. Lectures, laboratories, and readings. Prerequisite: permission of instructor. 4 units. *Hellmers*

252. Plant Metabolism. The physiochemical processes and conditions underlying the physiological processes of plants. Prerequisite: Botany 151 or equivalent; organic chemistry is recommended. 4 units. *Naylor*

254. Plant-Water Relations. A study of factors affecting the availability of water, its absorption and movement through plants, and the effects of water deficits on plant processes. Prerequisite: Botany 151 or equivalent. 3 units. *Kramer*

255. Plant Systematics. A survey of the principles of plant taxonomy. Prerequisite: Botany 52 or equivalent. 4 units. *Wilbur*

***257. Principles of Plant Distribution.** Interpretation of floristic and ecological plant geography. Prerequisite: Botany 156 or equivalent. 3 units. *Billings*

258. Physiology of Growth and Development. Consideration of the internal factors and processes leading to the production of new protoplasm and its differentiation at the cellular, tissue, and organ level in plants. Prerequisites: Botany 151 or equivalent; organic chemistry is recommended. 4 units. *Naylor*

***259. The Environment.** Environmental principles and methods of obtaining and evaluating environmental data for ecological purposes with special attention to instrumentation and microclimate. Prerequisite: Botany 156 or equivalent. 3 units. *Billings*

*Not offered 1972-73.

265. Physiological Plant Ecology. The physiological approach to interpreting adaptation in plants, with emphasis on terrestrial seed plants. Prerequisites: Botany 151 and 156 or equivalents. 4 units. *Strain*

266. Analysis and Classification of Vegetation. The concepts and methods of synecology; modern approaches with a review of historical aspects. Prerequisite: Botany 156 or equivalent. 4 units. *Strain*

280. Principles of Genetics. Introduction to the structure and properties of genes and chromosomes and to the evolution of genetic systems. Prerequisites: introductory courses in biology, chemistry, and mathematics or equivalent. (Also listed as Zoology 280 and under the University Program in Genetics.) 3 units. *Antonovics, Boynton, Gillham, and Others in the University Program in Genetics*

283. Developmental and Cellular Genetics. For description of the course, see the University Program in Genetics. 2 units. *Boynton and Gillham*

285. Population Genetics and Evolution. For a description of the course, see the University Program in Genetics. 3 units. *Antonovics and Staff*

359-360. Research in Botany. Individual investigation in the various fields of botany. Credits to be arranged. *All Members of the Graduate Staff*

The University Program in Genetics. Genetics courses offered by the Botany Department are an integral part of this interdepartmental program. Refer to the announcement in this *Bulletin* under the University Program in Genetics for description of the offerings:

204, Introductory Genetics; 215, Bacteriophage: Structure and Function; 216, Molecular Genetics; 236, Human Genetics; 280, Principles of Genetics; 282, Experimental Genetics; 283, Developmental and Cellular Genetics; 284, Current Topics in Genetic Mechanisms; 285, Population Genetics and Evolution; 288, The Cell in Development and Heredity; 336, Immunogenetics; 351-352, Genetics Seminar.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Central America. Refer to the section Organization for Tropical Studies in this *Bulletin* in the chapter Special and Cooperative Programs.

Business Administration

Professors Baligh, Keller, and Volpp; Associate Professors Battle, Burton, Dellinger, and Pondy; Assistant Professors Damon, Maier, and Petersen

The Graduate School of Business Administration offers work leading to the M.B.A., Ph.D., and the M.S. in Management Sciences. The M.B.A. program is designed for students whose undergraduate work included at least one year of calculus and an educational background adequate for rigorous analysis. Normally, undergraduate majors in such fields as the physical and biological sciences, mathematics, engineering, and the social sciences are well suited for the program. The M.B.A. program is designed to provide a thorough foundation in the concepts

and theory that underlie the design, operation, and control of modern complex organizations.

The Ph.D. program is designed for students who desire to enter either the academic profession or advanced and specialized administrative research positions. The doctoral level course work presumes either a Duke M.B.A. or the equivalent.

For information on the M.S. in Management Sciences, see page 88.

All 200-level courses in the Department of Management Sciences are open to graduate students from other departments. They are listed in the *Bulletin of Undergraduate Instruction*.

MASTER OF BUSINESS ADMINISTRATION

First Year Courses (Required)

300-301. Managerial Theory of the Firm. Classical economic theory and its further developments into more advanced, modern, and useful forms as elements of the fundamental theory of the firm are the subjects of this course. Major emphasis is on the theory of competitive price and non-price market behavior in single and multiple market segments, inventory and production planning, capital investment decisions, introductory concepts of cooperation for exchange (i.e., vertical production and marketing relationships), and formulation of the basic economic strategy of the firm. 5 units semester I and 4 units semester II.

310. Foundations for Quantitative Analysis I. Considers mathematical structures which are useful models for subsystems of an economic enterprise. The structures considered provide the framework for understanding and analyzing complex organizations and economic events, and develop problem-solving tools and techniques. This course provides the mathematical and statistical background beyond beginning calculus required in the M.B.A. program. Major topics are: sets, relations, and functions; introductory probability theory; linear algebra; classical optimization techniques; and introduction to linear programming. 5 units.

311. Foundations for Quantitative Analysis II. Continuation of B.A. 310. The major topics are: probability, statistical decision theory, sampling theory, estimation and hypothesis testing, and regression and correlation analysis. 4 units.

320. Management of Information and Control Systems I. The financial accounting model is developed as a critical subset of the general information system of the firm. This initial model is extended through consideration of general systems theory to encompass the economic and organizational models of the firm developed in B.A. 300 and 330. 3 units.

321. Management of Information and Control Systems II. The classical cost accounting model is developed and then restructured to provide data for planning and control of complex enterprises through use of modern managerial technology. This includes design of an information system that provides the data needed for advanced economic and organizational models of the firm. 3 units.

330-331. Organization Theory and Management. The first semester of this course is concerned with the analysis of purposive behavior in complex organizations. Theories of individual decision-making, human aspects of groups, and nor-

mative and descriptive systems are the major areas of concern. The second semester continues the work but emphasizes the firm as a social-political system. Strategy concepts, motives for collective activity, goal setting, and policy formulation are the primary topics. The course ends with an overview of the executive function within the administrative system. The purpose of the course is to provide the future administrator with an understanding of human behavior in groups and formal organizations, particularly as that behavior deviates from and extends Business Administration 300-301. In addition, the course provides the behavioral theories and findings necessary for treating the firm as an information-processing, problem-solving system in Business Administration 320-321. 4 units semester I and 2 units semester II.

341. Macroeconomic Analysis. The economic theory pertaining to the economy of the nation is developed in this course. The determinants of price level, rate of growth, and level of aggregate income, employment, and output are studied with emphasis on understanding the rationale of government policies and the impact of governmental behavior on these variables. 2 units semester II.

Second Year Courses—Fall Semester (Required)

The purpose of the work in the third semester of the M.B.A. program is to provide advanced tools of analysis and a general framework of understanding within which those tools can be applied. The relationships among the parts of the firm and the relationships between the firm and the various sectors of its environment can be classified into those which are competitive and those which are cooperative. (Obviously, the relationships between any two organizations are likely to contain both competitive and cooperative aspects.) The work in this semester is focused on more advanced analysis of how the firm's internal relationships and actions are related to the firm's external relations and actions. Since the legal framework is closely related to these matters, an introduction to some aspects of the law is included. Prerequisites for this set of courses are the courses in the first-year M.B.A. program.

302. Cooperative Decisions and Competitive Strategies. Problems of choosing cooperative economic relations in order to effect exchange transactions, and the problems of determining competitive behavior. The efficiency and stability of various forms of cooperative vertical market structures under simple competitive conditions are rigorously studied. Competitive market decisions are studied in the context of the formulation and solution of purely competitive market games. Although the more advanced and rigorous portions of the course are mathematical and theoretical, increasing emphasis is focused on the practical applications to markets and the development of realistic combinations of cooperative and competitive programs. 4 units.

303. Cooperative-Competitive Relations and Decisions. The firm's decisions on its cooperative and competitive behavior and on the design of its internal structure and its production and financial operations are treated simultaneously in the models of this course. The subject of the course is the firm's coordinated treatment of the decision variables which reflect its direct relations to those economic units with which it cooperates and competes to effect exchange

transactions, and those which relate to the form of its internal operations and organizational structures. 2 units.

312. Operations Research. Mathematical models of various aspects of economic operations are developed and solved, including topics in the areas of queuing, inventory, and maintenance. General procedures for the solution of mathematical problems involving the identification of maxima and minima are studied along with simulation and the use of the computer for the generation of solutions. 4 units.

332. Organization Design and Internal Operations. The design organizations for coordination and control of the internal operation is studied. The topics include: (a) specialization, both functional and hierarchical, with particular attention to the problems of decomposition and decentralization; (b) coordination, including benefit/cost analyses of alternative means of coordination; and (c) control, with emphasis on the role of information systems and the design of decision rules. These topics are examined for the organization in general, but with specific references and application to the production and finance segments. 4 units.

349. Law as a Constraint for Business. The major laws that specify the rules within which the firm must operate, including some aspects of the commercial code, anti-trust law, labor and fair employment law, the most significant regulatory agencies, and court cases that assist in understanding the application and interpretation of the law are studied. 2 units.

Second Year Courses—Spring Semester

This final semester of the M.B.A. program is oriented to bring to application the foundations built during the first three semesters. Hence, the bulk of the work in this semester is directed toward understanding and solving problems of the firm, using the tools of analysis and the conceptual framework developed earlier. The only specifically required courses are Business Administration 350 and 390.

350. Public Policy of the Firm. This course is focused on analysis of the relationships between the firm and the three segments of society: the public at large, the organizations and individuals in close contact with the firm, and the members or employees of the firm. Primary emphasis of the other parts of the M.B.A. program is on design and decision-oriented to reach the goals of the firm. This course treats some of the problems involved in selecting the ends and restraints from among feasible alternatives: i.e., the problems of developing a policy of the firm toward the society of which it is a part. 3 units.

390. The Practicum. The practicum is individually designed and is a major component of the second-year program designed to give the student a significant experience in applying the concepts, theories, and methods of analysis he learns in the program to a real, complex problem of an economic enterprise. It should include the analysis of the real situation and the explicit formulation of the problem. That is, the problem which the student treats in the practicum should not be described with only the solution left to be developed. The important task of identifying and specifying the actual problem, perhaps after being directed to correct some undesirable symptoms, is an integral part of the practicum.

The practicum report should propose a solution to the problem specified and should contain the explanation and logic that supports those recommendations. This solution should be one that can be implemented and must not ask for human or nonhuman resources unavailable for use in the proposed solution. Further, where the solution of the problem is sensitive to the assumptions made, those assumptions must be realistic. The practicum is supervised by one of the two professors teaching the electives selected by the student. 5 units.

313. Advanced Operations Research. Emphasis on application of dynamic and stochastic models and less to static and deterministic models and on the strategic design and control of more complex, multi-unit activities leads to formulation of operations research models and modification of existing models for new and novel problem situations. 4 units.

323. Controllership. The focus of this course is on developing systems for collecting and summarizing data in a manner which meets the requirements of the management team in its function of controlling and planning operations of the firm. The function of the controller, as the center for synthesis and analysis of data, is studied in the context of the foundations established during the first three semesters of the program. 4 units.

324. External Reporting and Auditing. This course builds on the information systems sequence of the first year and the public policy course, Business Administration 350, in terms of developing requirements of the system for reporting to parties, external to the firm, who have need for information about the activities of the enterprise for decision-making purposes. Communication and measurement problems as well as the role of the independent auditor in developing evidence of an attesting to the reliability of data will be studied in detail. 4 units.

333. Manpower Planning and Management. An application of behavioral and economic theories and of quantitative techniques to management of the firm's human resources, including treatment of both labor and management personnel. Detailed examination of American occupational structure (e.g., mobility patterns, increasing specialization, and professionalization) and analysis of the labor union as an institution are included. Topics studied within the constraints of industrial and labor institutional structure are: employee testing, selection and assignment, training and development, performance evaluation and optimal incentive systems, strategic and tactical factors in collective bargaining. 4 units.

351. Finance. The management of the financial affairs of the firm in its attempt to develop an optimal capital structure includes the sale of corporate securities of all varieties and the related knowledge about the requirements of investors at particular points in time, and the translation of plans and programs into needs which must in turn be met by cash resources from either internal or external sources. 4 units.

353. Marketing. An application of the general theories previously studied to the firm's marketing problems. Definition and resolution of these problems involves a more detailed discussion of the existing market environment of the firm. Problems studied are those of consumer behavior, marketing structures, product planning, pricing, promotion, logistics, and marketing research. 4 units.

355. Production. The purpose is to give the student experience in applying the theories developed during the first three semesters to problems of professional practice in the area of production management. Two major problem areas are covered: the design (or planning) of manufacturing systems and their operation (or control). Sub-topics under design include plant layout economic evaluation of materials, methods, and processes and facilities planning. Sub-topics under operation include cost, inventory, and quality control, short-run scheduling and capacity utilization, maintenance, start-up problems, and equipment replacement. 4 units.

DOCTOR OF PHILOSOPHY

One year of study (30 semester hours) beyond completion of the Duke M.B.A. degree or its equivalent is planned for each doctoral candidate. The year of study should include two courses in advanced economic theory, two courses in mathematics or statistics, one course in philosophy of science, and three courses in an elected field of administration. The latter are individually designed and are offered on a tutorial basis to provide extensive reading in the historical and current literature, and a demanding research program.

The requirements of the Graduate School are applicable to students in the Ph.D. program in business administration.

MASTER OF SCIENCE IN MANAGEMENT SCIENCES

300. Managerial Economics. Development of the fundamental theory of economic enterprise and use of that foundation in the analysis of economic operations. Theories of production, demand, and market behavior are developed to examine transformation and transaction operations of the firm. Emphasis is on optimum solutions to problems of internal efficiency and on design of cooperative and competitive strategies for the economic enterprise. 4 units.

302. Planning and Internal Organization. Short-run planning with emphasis on linear economic models and long-run planning with emphasis on capital budgeting models. Design of internal structure and management information systems for planning, implementation, and control. 4 units.

310. Mathematics for Management. Mathematics for optimization with and without constraints, in linear and nonlinear systems. Topics include partial derivatives, LaGrange multiplier, Kuhn-Tucker conditions, matrix algebra, and linear programming. 4 units.

311. Probability and Statistics. Foundations of probability theory and statistical decision theory. Topics include: events, random variables, distributions, expectation, independence, functions of random variables, Central Limit Theorem, Bayes Law, elementary utility theory, sequential decision problems, use of experiments in decision problems, and an introduction to classical statistical inference. 4 units.

312. Operations Research. The development of quantitative models for analysis of management decision problems. Topics include postoptimality analysis of

linear programming, network analysis, game theory, dynamic optimization models, and queuing theory. Several of these techniques are applied to the analysis of inventory problems. 4 units.

320. Organization Analysis and Operation Design. Analysis of organizations, emphasizing functional operations and design of the organization structure. Topics include determination of organization structure, the mechanisms of coordination, the requirements of information, the design and use of decision rules, the choice of a partitioning scheme for the organization, the mechanisms of control, and the interaction among them. 4 units.

330. Accounting and Control Systems. Use of accounting data for planning, evaluating, and controlling activities of the enterprise. Special consideration is devoted to the requirements for data in the models and methods useful in modern forecasting, planning, and control. 4 units.

341. Marketing Management. Analysis of the firm's general market competitive and cooperative strategy problem. Specific problem areas include pricing, product and product line design, promotion, logistics, and research, and the relationships among these various problem areas and their solutions. 4 units.

342. Financial Management. Sources and uses of financial resources for the firm are examined. Capital budgeting, cash management, and the mix of external financing are examined in the context of attempts to achieve the optimal capital structure of the firm. 4 units.

343. Production Management. Design of manufacturing systems, operating rules, and policies. Included are: choice of technology, design of the physical system, development of operating procedures and decision rules for scheduling, inventory and cost control, quality assurance, and the interaction of manufacturing with other functions of the firm. 4 units.

344. Human Resource Management. The design of plans and policies for effective and efficient management of the firm's human resources. Emphasis is placed on the development of policies for training, selection, compensation, and career planning which are consistent with the overall mission of the firm and with the firm's production, marketing, and financial policies. Some attention is devoted to discussion of the possible conflicts and trade-offs between corporate objectives and the welfare of individual members of the firm. 4 units.

350. Social Issues and the Complex Organization. Examination of issues that arise because market competition does not produce the effects demanded by society. Areas considered include: regulation of competitive activities, buyer protection, fair employment and labor relations, environmental protection, and social incentive for economic action. The effect of "self-regulation" and of "governmental regulation" are compared. 4 units.

390. Practicum. A major project in which the student selects a problem of an economic organization and develops its solution. Normally the problem is from the organization of which he is a part, and the problem is a specific case of the general area represented in the elective selected for concurrent registration. 4 units.

Chemistry

Professor Quinn, *Chairman* (101 Gross Chemical Laboratory); Professor Chesnut, *Director of Graduate Studies* (329 Gross Chemical Laboratory); Professors Bradsher, Brown, Hobbs, Jeffs, Krigbaum, Parham, Poirier, Smith, Strobel, and Wilder; Associate Professors McPhail, Palmer, and Wells; Assistant Professors Baldwin, Crumbliss, Gutknecht, Henkens, Lochmüller, and Porter; Adjunct Professor Peterlin; Adjunct Associate Professors Pitt and Rosenthal

In the Department of Chemistry graduate work is offered leading to the A.M. and Ph.D. degrees. Before undertaking a graduate program in chemistry, a student should have taken an undergraduate major in chemistry, along with related work in mathematics and physics.

Graduate courses in the department are offered in the fields of analytical, inorganic, organic, and physical chemistry. Research programs are active in all these fields.

A booklet providing detailed information on the department is available from the Director of Graduate Studies.

For Seniors and Graduates

216. Nuclear Chemistry. Elementary theory of nuclear reactions, properties of isotopes, and tracer techniques. Two lectures and three laboratory hours. Prerequisites: introductory physics and analytical and organic chemistry. 3 units. *Lochmüller*

217. Inorganic Chemistry. An advanced study of the bonding, structures, and reactions of inorganic compounds based on modern physical-chemical concepts. Three lectures. Prerequisite: one year of physical chemistry. 3 units. *Crumbliss, Palmer, and Wells*

234. Chemical Instrumentation. Physicochemical principles as applied to instrumental methods of analysis, illustrated by laboratory experiments with emphasis on methods involving electrical techniques. Two lectures and three laboratory hours per week. Prerequisites: quantitative and instrumental analysis and physical chemistry; the latter may be taken concurrently. 3 units. *Strobel*

240. Chemical Oceanography. For course description, see Zoology 240. (Also listed as Zoology 240.) Given at Beaufort. 6 units. *Staff*

252. Advanced Organic Preparations. A selected group of laboratory experiments on fundamental organic processes, techniques, and theories. One lecture and six hours of laboratory per week. Prerequisites: one year of organic chemistry. 3 units. *Brown*

253, 254. Structural and Physical Organic Chemistry. Topics to be discussed in the first semester will usually include stereochemistry, aromaticity, linear free energy relationships, and the structure of carbonium ions. In the second semester, orbital symmetry, photochemistry, free radicals and other reactive intermediates will be discussed. Chemistry 253 is a prerequisite for Chemistry 254. 3 units per semester. *Wilder and Porter*

255. Structural Analysis by Spectroscopic Methods. A study of the application of modern spectral methods of structure analysis of organic compounds. Topics will include nuclear magnetic resonance, optical rotatory dispersion, circular dichroism, and mass spectrometry. Prerequisites: Chemistry 155 and 253. 3 units. *Jeffs and Rosenthal*

256. Synthetic Methods and Organic Reactions. A study of the scope and limitations of the more important types of reactions of organic chemistry from the point of view of their practical use in the synthesis of organic compounds. Prerequisite: Chemistry 253. 2 units. *Baldwin and Bradsher*

261. Spectroscopy and Molecular Structure. An introduction to the principles of physical techniques employed in the elucidation of molecular structure, including topics such as symmetry, diffraction, magnetic resonance, and optical spectroscopy. Prerequisite: one year of physical chemistry. 2 units. *McPhail and Physical Chemistry Staff*

263. Thermodynamics. Review of classical thermodynamics, including application of chemical potentials to the treatment of equilibria in multi-component systems. Elementary statistical thermodynamics; use of partition functions for the ideal monatomic gas, harmonic oscillators, and rigid rotators. Derivation of Debye-Hückel equation; special topics. Prerequisite: one year of physical chemistry and one year of calculus. 2 units. *Krigbaum*

264. Biophysical Chemistry. Application of the principles and techniques of physical chemistry to biological problems. Three lectures per week. Prerequisites: Chemistry 160 or 161. 3 units. *Henkens*

267. Introductory Quantum Mechanics. The fundamentals of quantum mechanics with elementary applications. Linear algebra; the uncertainty relations; the harmonic oscillator, hydrogen-like systems; angular momentum; perturbation theory; chemical bonding; time-dependent phenomena. Three lectures per week. Prerequisites: One year of physical chemistry. 3 units. *Chesnut*

271. Introduction to Research. Lectures on the use of chemical literature, research methods, recording and publication of results, and other topics. 1 unit. *Brown*

For Graduates

315. Topics in Transition Metal Chemistry. The application of ligand field theory and group theory to the interpretation of the properties of transition metal compounds. Areas covered include electronic, vibrational, nuclear magnetic resonance, and electron paramagnetic resonance spectroscopy, magnetic susceptibility, and reaction mechanisms. Prerequisite: Chemistry 217. 3 units. *Crumbliss and Palmer*

316. Topics in Non-Metal Chemistry. A general survey of the chemistry of compounds of the non-metals. Special emphasis will be given to preparations, structures, and reactions of compounds of silicon and boron. Prerequisite: Chemistry 217 or equivalent. 3 units. *Wells*

317, 318. Seminar in Inorganic Chemistry. Lectures, oral reports, and discussion on advanced topics and recent advances in the field of inorganic chemistry. Prerequisite: Chemistry 217. 2 units. *Inorganic Chemistry Staff*

331, 332. Seminar in Analytical Chemistry. A survey of the current literature of analytical chemistry and discussion of special topics. Prerequisite: Chemistry 234. 1 unit per semester. *Analytical Chemistry Staff*

333. Separation Methods. Theoretical and practical aspects of modern separation techniques including chromatography, distillation, fractionation, elements of kinetic and plate theory at the mobile-stationary-phase interface. Prerequisite: Chemistry 161, 162 or equivalent. 2 units. *Lochmüller*

338. Advanced Analytical Chemistry. Guidelines—theoretical and practical—for the selection of analytical methods based on complexation reactions; aspects of quantitative measurement by spectroscopic methods with emphasis on the choice of technique and interferences to be expected. Prerequisites: One year of analytical and physical chemistry. 3 units. *Analytical Chemistry Staff*

350. Organic Reactions. A study of the scope and limitations of the more important types of reactions of organic chemistry from the point of view of their practical use in the synthesis of organic compounds. Prerequisite: Chemistry 253. 2 units. *Bradsher*

353. Special Topics in Organic Chemistry. Topics of interest to the organic chemist. Prerequisite: Chemistry 253. 2 units. *Organic Chemistry Staff*

354. Advanced Physical Organic Chemistry. Selected topics from contemporary problems in physical organic chemistry. Prerequisite: Chemistry 254 or its equivalent. 2 units. *Porter and Wilder*

355. Special Topics in the Chemistry of Natural Products. A study of the structure and biosynthesis of natural products, with particular emphasis on recent advances in the field of alkaloid chemistry. Prerequisite: Chemistry 255. 2 units. *Jeffs*

356. Heterocyclic Chemistry. A study of synthetic methods and physical and chemical properties of selected families of heterocyclic compounds. 2 units. *Quin*

360. Polymer Chemistry. A survey of the methods of preparation of high-molecular-weight organic compounds and a study of the properties characteristic of macromolecules in solution and in the solid state. Prerequisite: Chemistry 263. 3 units. *Krigbaum and Peterlin*

362. Kinetics of Chemical Reactions. A presentation of the more important facts and theories relating to the rates with which chemical reactions occur in the gas phase, in solution, in the solid state, and at phase interfaces. Prerequisite: Chemistry 263. 2 units. *Smith*

364. Special Topics in Physical Chemistry. A presentation of one or more topics in the field of physical chemistry of special interest to the faculty. Prerequisite: Chemistry 263. 2 units. *Physical Chemistry Staff*

365. Introductory Statistical Mechanics. Fundamentals of classical and quantum statistical mechanics. Intermediate statistical thermodynamics. Ensemble theory. Statistical theories of solids and lattices. Prerequisites: Chemistry 263 or 267. 3 units. *Poirier*

366. Statistical Mechanics. Statistical mechanics of systems of strongly interacting elements; theories of fluids and solutions. Selected advanced topics: distribution function methods, graph-theoretical methods. Prerequisites: Chemistry 365. Corequisite: Mathematics 285. 2 units. *Poirier*

368. Quantum Mechanics. Molecules in electromagnetic fields, group methods and electron correlation. Prerequisite: Chemistry 267. Corequisite: Mathematics 285. 2 units. *Chesnut*

373, 374. Seminar. Required of all graduate students in chemistry. One hour a week discussion. 1 unit per semester. *All Members of the Graduate Staff*

375, 376. Research. The aim of this course is to give instruction in methods used in the investigation of original problems. Individual work and conferences. 1 to 6 units. *All Members of the Graduate Staff*

377. Research Orientation Seminar. A survey of departmental research. Required of all entering graduate students in chemistry. Prerequisite: permission of the Director of Graduate Studies. 1 unit. *All members of the Graduate Staff*

381. Laboratory in Organic Chemistry. A course designed to provide laboratory experience in qualitative organic analysis for students lacking prior training in this area. Prerequisite: permission of the Director of Graduate Studies. 2 units. *Quin*

382. Laboratory in Analytical Chemistry. A course designed to provide laboratory experience in instrumental analysis for students lacking prior training in this area. Prerequisite: permission of the Director of Graduate Studies. 1 unit. *Lochmüller*

Classical Studies

Professor Oates, *Chairman* (325 Carr); Professor Richardson, *Director of Graduate Studies* (312 Carr); Professors Newton, Truesdale, and Willis; Associate Professor Stanley; Assistant Professors Burian, Nixon, and Rigsby

The Department of Classical Studies offers two programs leading to the Ph.D. degree, one with emphasis on literature and philology, the other with emphasis on ancient history and archaeology. For regular admission to the program in literature and philology, a student must offer three years of college study above the elementary level in one of the classical languages and two college years in the other. Students wishing to enter the program in ancient history and archaeology will be required on entrance to demonstrate satisfactory competence in both Greek and Latin for reading in the primary sources; failure to demonstrate such competence will require modification of the student's program to repair the deficiency.

The department's special requirements in addition to the general requirements of the University for the Ph.D. degree set forth in the section on Program Informa-

tion of this *Bulletin* are presented in a sheet that may be obtained from the Director of Graduate Studies. They include special requirements in seminars, course work, and the preliminary examinations for the Ph.D. degree.

A reading knowledge of German and French is required of all candidates for the Ph.D. degree. The candidate should meet one of the language requirements by the end of his first term in residence and the other by the end of his third term.

GREEK

For Seniors and Graduates

200. Graduate Reading. 3 units. *Truesdale*

***203. Homer.** The *Iliad* and *Odyssey*; the problem of language and structure in the epic; present state of Homeric scholarship. 3 units. *Stanley*

***205. Greek Lyric Poets.** Fragments of the early lyric poets; selected odes of Pindar and Bacchylides. 3 units. *Truesdale*

***206. Aeschylus.** The *Oresteia*, with study of the form of *Agamemnon* and its place in the design of the trilogy. 3 units. *Willis*

***208. Sophocles.** The Theban plays; the structure and style of Sophoclean tragedy. 3 units. *Willis*

***209. Euripides.** Representative tragedies in their political and philosophical context; analysis of dramatic form and texture. 3 units. *Stanley*

***210. Aristophanes.** Origin and development of Greek comedy; representative plays of Aristophanes. 3 units. *Truesdale*

221. Early Greek Prose. Greek prose in the fifth century from the Ionian scientists and logographers to Herodotus, Gorgias, Antiphon, and the Old Oligarch. 3 units. *Truesdale*

***222. Thucydides.** The History; Thucydides' historical method and style. 3 units. *Willis*

***223. Greek Orators I.** Early fourth-century rhetoric, including Andocides, Lysias, and Isocrates. 3 units. *Willis*

***224. Greek Orators II.** Aeschines' *Against Ctesiphon* and Demosthenes' *On the Crown* in the light of fourth-century political history and rhetorical development. 3 units. *Willis*

***225. Plato.** Selected dialogues and related passages illustrating the development of philosophical topics and stylistic motifs. 3 units.

***231. Hellenistic Poetry.** The principal lyric, elegiac, pastoral, and didactic poets of Alexandria; emphasis on Callimachus and Theocritus. 3 units. *Stanley*

***241. Advanced Prose Composition.** Xenophon, Lysias, and other prose authors as models of style and practice in the writing of Attic prose. 1 unit. *Willis*

*Not offered in 1972-73.

For Graduates

(At least two of these are offered each year.)

- 301. Greek Seminar I. 3 units.
- 302. Greek Seminar II. 3 units.
- 303. Greek Seminar III. 3 units.
- 304. Greek Seminar IV. 3 units.
- 305. Greek Seminar V. 3 units. *Stanley*
- 306. Greek Seminar VI. 3 units. *Oates*
- 311. Proseminar in Papyrology. 3 units. *Willis*
- 313. Proseminar in Greek Epigraphy. 3 units. *Willis*
- 321. Seminar in Literary Papyri. 3 units. *Willis*
- 323. Seminar in Documentary Papyri. 3 units. *Oates*
- 399. Directed Reading and Research. Variable credit. *Stanley*

LATIN

For Seniors and Graduates

- 200. Graduate Reading. 3 units. *Rigsby*

*201. **The Verse Treatise.** The genre of didactic poetry; emphasis on Lucretius' *De Rerum Natura*, Vergil's *Georgics*, and Ovid's *Ars Amatoria*; attention to Cicero's *Aratea*, the *Astronomica* of Manilus, Horace's *Ars Poetica*, and Ovid's *Fasti*. 3 units. *Newton*

*202. **Roman Satire.** A survey of the genre, with concentration on Horace, Juvenal, and Persius. 3 units.

- *203. **Epic: Vergil.** The *Aenid*. 3 units. *Newton*

*204. **Epic: Lucan and Statius.** The development of the Roman epic in the Silver Age. 3 units. *Richardson*

*207. **The Prose Epistle.** The letter as a vehicle of communication and as a literary form. 3 units. *Richardson*

208. **The Epistle in Verse.** The verse letter as a literary form; reading in the *Epistles* of Horace, the *Heroides* of Ovid, and Statius. 3 units.

*209. **Fragments of Early Latin.** The remains of Latin poetry of the third and second centuries B.C., from Livius Andronicus to Lucilius, with emphasis on the epic and drama of Ennius. 3 units. *Stanley*

*210. **Lyric and Occasional Poetry.** Shorter verse forms; epigram, pastoral, song, and panegyric. 3 units.

*Not offered in 1972-73.

***211. Roman Oratory I.** The literary history and criticism of Roman oratory. 3 units. *Richardson*

***212. Roman Oratory II.** A continuation of Latin 211. 3 units.

***221. Mediaeval Latin I.** Latin literature of late antiquity, from Prudentius to the Carolingian Revival. 3 units. *Newton*

***222. Mediaeval Latin II.** Literature in Latin from Charlemagne to the Renaissance. 3 units. *Newton*

***241. Advanced Latin Composition.** Experiments in imitation of the great Latin prose styles and introduction to the composition of verse. 1 unit. *Richardson*

For Graduates

(At least two of these are offered each year.)

301. Latin Seminar I. 3 units.

302. Latin Seminar II. 3 units.

303. Latin Seminar III. 3 units.

304. Latin Seminar IV. 3 units.

305. Latin Seminar V. 3 units. *Newton*

306. Latin Seminar VI. 3 units. *Newton*

312. Proseminar in Latin Palaeography. 3 units. *Newton*

314. Proseminar in Latin Epigraphy. 3 units.

315. Proseminar in Roman Law. 3 units.

399. Directed Reading and Research. Variable credit. *Newton*

CLASSICAL STUDIES

For Graduates

301. Introduction to Classical Philology. Introduction to the bibliography and principal disciplines of the field. 3 units. *Willis and Graduate Staff*

CLASSICAL STUDIES (ANCIENT HISTORY)

For Seniors and Graduates

***253. Greece to the Orientalizing Period.** 3 units. *Oates*

***254. The Age of the Tyrants and the Persian Wars.** 3 units. *Oates*

***255. The Age of Pericles.** 3 units. *Oates*

***256. The Fourth Century through Alexander.** 3 units. *Oates*

*Not offered in 1972-73.

***257. Social and Cultural History of the Hellenistic World from Alexander to Augustus.**

***258. Social and Cultural History of the Graeco-Roman World.**

***260. The History of Rome to 146 B.C.** 3 units. *Staff*

***261. The Roman Revolution, 146-30 B.C.** 3 units. *Oates*

***262. Rome under the Julio-Claudians.** 3 units. *Nixon*

263. From the Flavian Dynasty to the Severan. 3 units. *Nixon*

264. From Septimius Severus to Constantine. 3 units. *Staff*

***270. The Rise of the Hellenistic Kingdoms.** 3 units. *Oates*

***271. The Hellenistic Kingdoms 250-31 B.C.** 3 units. *Oates*

For Graduates

(At least two of these are offered each year.)

321. Seminar in Ancient History I. 3 units.

322. Seminar in Ancient History II. 3 units.

323. Seminar in Ancient History III. 3 units.

324. Seminar in Ancient History IV. 3 units.

325. Seminar in Ancient History V. 3 units. *Oates*

326. Seminar in Ancient History VI. 3 units. *Oates*

CLASSICAL STUDIES (ARCHAEOLOGY)

For Seniors and Graduates

***231. Greek Sculpture.** Techniques and styles of the major schools and personalities in archaic, classical, and Hellenistic free-standing and architectural sculpture. 3 units. *Stanley*

232. Greek Painting. Techniques and style in the various media; emphasis on the problems of chronology, attribution, and iconography of Attic pottery. 3 units. *Stanley*

***235. Roman Architecture.** Significant monuments chosen to exemplify the Roman genius in building in the late Republic and early empire. 3 units. *Richardson*

***236. Roman Painting.** Roman pictorial art with concentration on the wall-paintings from Campania. Investigation of techniques, iconography, and the use of pictures in decoration. 3 units. *Richardson*

*Not offered in 1972-73.

For Graduates

(One course is offered each year.)

311. Archaeology Seminar I. 3 units. *Stanley*

312. Archaeology Seminar II. 3 units.

Under the terms of a cooperative agreement, graduate students of Duke University may, with the approval of the chairman of their major department, take any graduate course offered by the Department of Classics of the University of North Carolina by the payment of a nominal fee. A list of these courses will be sent upon request.

Comparative Literature

No graduate degree is offered in comparative literature. The following courses may serve in the minor programs of students in other departments. Professor Salinger is a member of the Department of Germanic Languages and Literature.

201, 202. Romanticism. Studies in the origin, rise, and development of the Romantic Movement in the chief literatures of the Western world. The approach is comparative; the principal emphasis will be on England, France, and Germany with some reference to other countries. Selected subjects will occasionally be covered in lectures by speakers from various departments of the University. 3 units per semester. *Salinger*

203, 204. Realism and Symbolism. Comparative studies in the literatures of England, France, Germany, Russia, the Scandinavian countries, Spain, and Italy, tracing the decline of romantic individualism and the reappraisal of man's significance against the social background. Selected subjects will occasionally be covered in lectures by speakers from various departments of the University. 3 units per semester. *Salinger*

205. Foundations of Twentieth Century European Literature. The roots of the contemporary scene (Proust, Mann, Rilke, Kafka, Lagerkvist, Camus, Gide, and Hesse) evolving toward a mythology of man. 3 units. *Salinger*

301. The Hero in European Fiction, 1830-1940. Studies in the "loss of self" from Balzac to Robert Musil. Intended primarily for minors in comparative literature. Prerequisite: permission of instructor. 3 units. *Salinger*

Computer Science Program

Professor Gallie, *Director* (401 Computation Center); Associate Professor Patrick, *Director of Graduate Studies* (405 Computation Center); Professors Naylor and Woodbury; Associate Professor Starmer; Assistant Professors Hammond and Ramm; Adjunct Associate Professor Williams

The Computer Science Program offers basic graduate courses leading to the A.M. degree. Research and course work in the field of computer science may be elected as a specialization by candidates for the Ph.D. who are under the direction

of the Departments of Electrical Engineering, Economics, Mathematics, and others. A student entering graduate work in computer science should have a knowledge of mathematics through advanced calculus and differential equations and of at least two computer programming languages. The research areas currently active within the program include compiler design, real-time computing, information storage and retrieval, computer design, simulation of systems of interest to social scientists, and numerical analysis.

For Seniors and Graduates

203. Random Signals and Noise. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory: joint, conditional, and marginal distributions; random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting filters. Introduction to optimum signal detection and parameter estimation. (Also listed as Electrical Engineering 203.) Fall semesters. 3 units. *Kerr and Nolte*

205. Signal Detection and Extraction Theory. Introduction to signal detection and information-extraction theory from a statistical decision theory viewpoint. Subject areas covered within the context of a digital environment are decision theory, detection and estimation of known and random signals in noise, estimation of parameters and adaptive recursive digital filtering, and decision processes with finite memory. Applications to problems in communication theory. Prerequisite: Computer Science 203 or permission of instructor. (Also listed as Electrical Engineering 205.) Spring semester. 3 units.

208. Digital Computer Design. Fundamentals of digital computer design. Digital arithmetic; hardware implementation of combinational and sequential logic circuits—adders, multipliers, switching matrices, shift registers, counters, comparators, and character generators. Detailed design of a simple digital computer system. Selected laboratory work. Prerequisite: Computer Science 157 or permission of instructor. Spring semesters 1971, 1973. (Also listed as Electrical Engineering 208.) 3 units. *Marinos and Owen*

211, 212. Real-Time Data Acquisition Systems. Hardware and software techniques for data acquisition will be covered. Algorithms will be developed for supporting a multi-programmed system operating in a real time environment. 3 units per semester. *Starmer*

221, 222. Numerical Analysis. Introduction to numerical analysis, error analysis, interpolation, numerical differentiation and integration, summation, numerical solutions of ordinary differential equations, real and complex roots of equations, solution of simultaneous equations and matrix inversion, calculation of eigenvalues and eigenvectors, numerical solution of partial differential equations, linear programming, and least-squares techniques. A knowledge of computer programming is assumed. (Also listed as Mathematics 221, 222.) 3 units per semester. *Patrick*

231. Operating Systems. A study of the characteristics which are required

of an operating system and methods for implementation. Case studies of both small and large existing systems will be made. 3 units. *Ramm*

232. Metaprograms. Programs which process programs: compilers, interpreters, assemblers. Syntax and semantics of programming languages. 3 units. *Gallie*

241, 242. Information Organization and Retrieval. This course deals with the structure, analysis, organization, storage, searching, and retrieval of information. Studied in particular will be structure of files, dictionary construction and look-up, search and matching procedures, indexing, file maintenance, and methods for user interaction with the automated system. Practical programming experience in such techniques will be included. Prerequisite: Computer Science 51, 152. 3 units per semester. *Hammond*

244. Econometrics II. A course on the design of computer simulation experiments for economic systems. Topics include generation of stochastic variates, computer models of queuing and inventory systems, models of the firm and industry, models of the economy, simulation languages, and experimental design. (Also listed as Economics 244.) 3 units. *Naylor*

250. Clustering and Classification. Algorithms and operating characteristics of clustering and classification methods. Data models for sequential data acquisition, clustering in terms of nearest neighbor, and/or mixtures of distributions (missing information principle). Characterization of patient groups versus normal groups and selection of measures to characterize diseases as super-clusters. Application of Bayes' procedures to classification into clusters and super-clusters. Prerequisite: permission of instructor. 3 units. *Woodbury*

265. Advanced Topics in Computer Science. Opportunity for study of advanced problems in computer science, possibly leading to the development of a substantial computer program. 3 units. *Staff*

306. Adaptive Detection and Communication Systems. Sequential detection, Wald's sequential probability ratio test, sequential tests of composite hypotheses, deferred decision theory; adaptive systems, nondecision-directed and decision-directed measurements, adaptive on-off communications system, transmitted reference systems, detection systems employing the learning feature, learning with and without a teacher, pattern recognition. Applications to communication system. Prerequisite: Computer Science 205 or permission of instructor. (Also listed as Electrical Engineering 306.) Fall semesters 1971, 1973. 3 units. *Nolte*

307. Advanced Digital Systems I. A unified treatment of finite-state deterministic systems. Models and elementary properties of sequential machines; sequential machine compatibility; equivalence and state minimization; state assignment for sequential machines; state and machine identification experiments; asynchronous and speed independent switching circuits; theory of regular expressions. Prerequisite: Computer Science 157 or permission of the instructor. (Also listed as Electrical Engineering 307.) 3 units. *Marinos*

308. Advanced Digital Systems II. A continuation of Computer Science 307. Machine decomposition; design of reliable systems from unreliable com-

ponents; probabilistic and fuzzy automata; recognition devices; automata and their relation to context-free languages. Prerequisite: Computer Science 307 or permission or instructor. Spring semesters, 1972, 1974. (Also listed as Electrical Engineering 308.) 3 units. *Marinos*

311. Inverse Biomedical Models. Analytical and computational methods for determining the internal state of a biological system from a set of external measurements and a priori characterization of the system. Difference and integral equation formulations of volume conductor problems, variational methods, perturbation techniques, eigenvalue problems, and quasilinearization. Particular emphasis is placed on the inherent limitations and difficulties encountered in obtaining numerical solutions from inverse formulations and the value of constraints in reducing these difficulties. (Also listed as Biomedical Engineering 311.) 3 units. *Pilkington*

Economics

Professor Davies, *Chairman* (302 Social Science); Professor Yohe, *Director of Graduate Studies* (313 Social Science); Professors Blackburn, Bronfenbrenner, de Vyver, Goodwin, Hanna, Kreps, Naylor, Saville, and Spengler; Associate Professors Havrilesky, Trembl, and Vernon; Assistant Professors Black, Clark, Graham, Salkin, McElroy, and Weintraub

The Department of Economics offers graduate work leading to the A.M. and Ph.D. degrees. A student entering graduate work in economics should have completed with satisfactory grades at least 12 semester hours of undergraduate work in economics, including 6 hours of principles of economics. Among the undergraduate courses of distinct advantage to the graduate student in economics are general accounting, elementary statistics, intermediate economic theory, money and banking, international trade, and basic courses in philosophy, mathematics, and social sciences other than economics.

Requirements for the Ph.D. in economics include a core of courses or equivalent preparation in mathematical economics, statistical methods, microeconomic and macroeconomic theory, and the history of economic thought. Economic growth and demography, money and banking, international trade, labor economics, economic history, public finance, industrial organization, statistics, and econometrics are optional fields, of which the student elects at least two in preparation for the preliminary doctoral examination. Course requirements for the Ph.D., including a minor field, should be completed in four semesters of residence.

For Seniors and Graduates

204. Advanced Money and Banking. 3 units. *Yohe*

231. Economic Development of Europe. Sequence of local, national, and international economic structures under situations of changing trade, industry, agriculture, population, investment, war conditions, public ownership, cartels, colonialism, and prices. 3 units. *Saville*

***233. State and Local Finance.** A study of expenditures, taxation, and financial administration in state and local governments, with emphasis on current

*Offered on demand.

problems. Special attention will be given to research methods and materials, and to the financial relations between state and local governments. 3 units. *Davies*

237, 238. Statistical Methods. A study of statistical methods appropriate for dealing with problems in business and the social sciences. In addition to developing more thoroughly the subject considered in Business Statistics, the following methods will be considered: multiple, partial, and curvilinear correlation; curve fitting; probability; sampling distributions; and statistical inference. Prerequisite: Economics 138 or consent of the instructor. 3 units per semester. *Hanna*

243. Econometrics I. Economic theory, mathematics, statistical inference, and electronic computers applied to analysis of economic phenomena. Objective is to give empirical content to economic theory. Matrix algebra used to develop topics in inference, linear regression, and systems of simultaneous equations. Use is made of the electronic computer. 3 units. *Naylor and McElroy*

244. Econometrics II. A course on the design of computer simulation experiments for economic systems. Topics include generation of stochastic variates, computer models of queuing and inventory systems, models of the firm and industry, models of the economy, simulation languages, and experimental design. (Also listed as Computer Science 244.) 3 units. *Naylor*

262. Trade Unionism and Collective Bargaining. An intensive survey of the trade union as an economic institution is followed by a study of the principles and problems of union-management relationship as found in collective bargaining. 3 units. *de Vyver*

265. International Trade and Finance. A study of the fundamental principles of international trade and foreign exchange. Subjects covered will include international specialization, balance of payments, foreign investments, tariffs and commercial policies, exchange control, exchange rates, and international monetary problems. 3 units. *Clark*

268. Competition and Monopoly. 3 units. *Vernon*

287. Public Finance. An analysis of the impact of governmental expenditures, revenues, and debt on the allocation of resources, the redistribution of income, and the stabilization of income. 3 units. *Black and Davies*

293. Soviet Economic History. Economic policy-making in the Soviet Union in a historical setting. 3 units. *Trembl*

294. Soviet Economic System. A study of the Soviet economic system with an emphasis on theoretical problems of allocation of resources, economic development, and optimal micro decision-making in a non-market economy. 3 units. *Trembl*

301. Microeconomic Analysis I. Review of contemporary theory relating to production, the firm, and income distribution in competitive and imperfectly competitive markets. 3 units. *Graham*

302. Microeconomic Analysis II. A continuation of Economics 301, with emphasis on analyses of consumer behavior, general equilibrium, welfare economics, and capital theory. Prerequisite: Economics 301. 3 units. *Burmeister and Salkin*

303. Theory of Economic Decision-Making. The extension of economic theory to the allocation of resources within firms and governmental units. Prerequisite: Economics 301 or its equivalent. 3 units. *Broussalian*

304, 305. Seminar in Money and Banking. In the first semester, a survey of theories of the level and structure of interest rates and the relationships among the money supply, interest rates, income, and price levels; second semester, recent issues in monetary theory and monetary policy, particularly theories of credit rationing, the financial intermediaries controversy, and the monetary policy transmission mechanism. 3 units per semester. *Yohe and Havrilesky*

307. Quantitative Analysis I. A systematic analysis of the principal quantitative methods used in microeconomic theory. Neo-classical theories of production and distribution are used as vehicles for presenting the material. Considerable emphasis is placed on the application of mathematical analysis to economic models. 3 units. *McElroy*

308. Quantitative Analysis II. Linear economic models, particularly Leontief models, are used in the exposition. Primary emphasis is placed on the application of mathematics to economic theory. Prerequisite: Economics 307 or consent of instructor. 3 units. *Graham*

311, 312. History of Political Economy. A detailed review of the development of economic theory, the tools of economic analysis, and economics as a science, together with an analysis of the circumstances affecting this development. Period covered: pre-Christian times through 1936. 3 units per semester. *Goodwin and Spengler*

313, 314. Seminar in Economic Theory. Prerequisite: Economics 301 or its equivalent. 3 units per semester. *Weintraub*

316. Seminar in Economics of Soviet-Type Socialism. Selected topics in analysis of theoretical and institutional framework of Soviet economic system, such as markets versus plan, optimizing techniques in planning, price determination, balanced economic development, and ideology and economic policy. 3 units. *Trembl*

317. Seminar in Demographic, Population, and Resource Problems. 3 units. *Spengler*

318. Dissertation Seminar. 3 units. *Staff*

319. Seminar in the Theory and the Problems of Economic Growth and Change. 3 units. *Spengler*

320. Macroeconomic Analysis I. Measurement of national income and other important aggregates; classical macroeconomics; Keynesian and more recent views of the determinants of income, employment, and price levels; empirical studies of consumption, investment, and monetary variables. 3 units. *Blackburn, Bronfenbrenner, and Weintraub*

321. Theory of Quantitative Economic Policy. The use of mathematical models in analyzing the connections between means and ends of economic policy; topics covered include principles and design, centralization and decentralization,

stabilization and growth policies, welfare optimization, imperfect models, and the use of control system analysis. Prerequisite: Economics 320. 3 units.

322. Macroeconomic Analysis II. Further analysis of topics treated in Economics 320. Optimal economic growth; business cycles. Issues in economic policy. Prerequisite: Economics 320. 3 units. *Weintraub*

323. Income Distribution Theory. Income distributions—functional and personal. Concepts and measures of poverty and inequality. Maldistribution issues—ethical and economic. Pricing of productive services, primary attention on wages and employment. Rival aggregative (macro distribution) theories. Prerequisites: intermediate micro- and macro-economics and some knowledge of calculus and statistics. *Bronfenbrenner*

329. Federal Finance. An analysis of the trends and hypotheses concerning the growth in governmental activity, the optimum level and composition of governmental spending, and the microeconomic and macroeconomic effects of governmental spending and tax policies. 3 units. *Davies*

330. Seminar in Public Finance. 3 units. *Davies*

331. Seminar in Economic History. 3 units. *Gould*

***340. National Income.** A critical survey of the conceptual framework and structure of national income and its components, the reliability of national income estimates, and their use in analyzing questions of economic policy. 3 units. *Hanna*

344. Workshop on Computer Models of Social Systems. 3 units.

345, 346. Demographic Techniques I and II. (Also listed as Sociology 345, 346.) 3 units each semester. *Myers and Hartford*

350. Seminar in Applied Economics. A course that will use the principles of micro-economics in the analysis of problems and policies. The particular contextual materials that will be subjected to analysis will vary from time to time. Materials will be treated in the tradition of positive economics.

355. Seminar in Labor Economics. 3 units. *de Vyver*

358. Seminar in Labor Market and Related Analysis. 3 units.

365. Seminar in International Economics. 3 units. *Clark*

366. Monetary Aspects of International Trade and Finance. The monetary, as opposed to the pure, side of international economics. Among the topics considered are the balance of payments, the foreign-exchange market capital movements, payments equilibrium, the demand for reserves, and international monetary reform. 3 units. *Clark*

***388. Industrial Organization.** The theory, measurement, and history of the firm-structure of industry. Emphasis upon the structure of American industry and upon actual production and pricing practices. Criteria for evaluating industrial performance. 3 units. *Vernon*

*Offered on demand.

*389. Seminar in Industrial and Governmental Problems. 3 units. *Vernon*

397, 398. Directed Research.

401. Seminar on the British Commonwealth. 3 units. *Ball, Braibanti, Cole, and Spengler*

402. Interdisciplinary Seminar in the History of the Social Sciences. 3 units. *Goodwin, Holley, Spengler, and Spragens*

Related Courses in Other Departments

Courses comprising a candidate's minor may be selected from fields of computer science, forestry, history, mathematics, philosophy, political science, and sociology and anthropology, or from an area that complements the candidate's area of research interests in economics.

See Program in Comparative Studies on Southern Asia and The Population Studies Program in the chapter on Special and Cooperative Programs for further information.

Education

Professor Hurlburt, *Chairman* (213I West Duke Building); Associate Professor C. Johnson, *Director of Graduate Studies* (213C West Duke Building); Professors Bowman, Cartwright, Gehman, Githens, Hopkins, Petty, Shuman, and Weitz; Associate Professors Adams, Ballantyne, Carbone, Colver, Di Bona, Katzenmeyer, Martin, Pittillo, and Sublett; Assistant Professor L. Davis; Visiting Associate Professor Erickson; Adjunct Professor J. Davis

Graduate work in education is offered leading to the A.M., the M.Ed., the M.A.T., the Ed.D., and the Ph.D. degrees. For each of these degrees there are specific requirements and prerequisites, all of which may be found stated in detail in this *Bulletin*. Departmental requirements and prerequisites for all of these degrees may be obtained from the Director of Graduate Studies.

From the courses listed below, plus several in related disciplines, a selection may be made which will meet North Carolina requirements for the Advanced Principal's Certificate, the Superintendent's Certificate, and the Supervisor's Certificate.

(Some courses below are offered only in the summer session; see the *Bulletin of the Summer Session*.)

These programs are accredited by the National Council for Accreditation of Teacher Education for the preparation of elementary and secondary school teachers and school service personnel with the doctor's degree as the highest degree approved.

For Seniors and Graduates

201. Teaching and Supervision of Arithmetic. This course gives special attention to the number system, the fundamental operations (with whole numbers, fractions, and decimals), percentage, and measurements. Consideration given to

*Offered on demand.

meaning theory, method of teaching, problem-solving, evaluation, practice and drill, and selection and gradation of arithmetical contents. Designed for teachers and supervisors in the elementary school. 3 units. *Petty*

202. Comparative and International Education: Industrialized Nations. Structure and functioning of educational institutions in selected developed societies. Relevant social science theory and methods emphasized. 3 units. *Di Bona*

204. Educational Organization. Explores theory and research on the processes of exchange between educational organizations and their external environments, and the influence of these processes on organizational structure, goals, and practices. Schools, colleges, and universities are considered as separate types of educational organizations, and a comparative approach is emphasized in examining these as well as other forms of social organizations, e.g., hospitals, businesses, and prisons. 3 units. *Martin*

206. Studies in the History of Educational Philosophy. The educational views of leading thinkers in the history of Western philosophy, including Plato, Augustine, Locke, Rousseau, Kant, Whitehead, and Dewey. 3 units. *Carbone*

207. Social History of Twentieth-Century American Education. The development of twentieth-century American education in the context of social and intellectual history. 3 units. *Johnson*

211. The Problem Child. Study of problem behavior and adjustment in children with emphasis on the causes and treatment of conduct and neurotic disorders of the maladjusted child. Particular attention will be paid to mental hygiene principles in the handling of problem children in school and home. (Also listed as Psychology 211.) 3 units. *I. Gehman*

***213. Elementary-School Organization and Administration.** This course is designed especially for principals, teachers, and other prospective members of the elementary-school staff. The scope of elementary education is considered to encompass nursery school, kindergarten, and the elementary school. Special treatment is given to the problems of internal organization and management of the elementary school, and its integration with the secondary-school level. 3 units. *Sublett*

215. Secondary Education: Principles. Intensive study of principles, curriculum, and methods in secondary education. Accelerated course meeting six hours a week for half a semester. Must be accompanied by Education 216. 3 units. *Cartwright, Githens, Johnson, and Shuman*

216. Secondary Education: Internship. Supervised internship in junior or senior high schools. Full-time observation and teaching for half a semester, accompanied by Education 215; or, with permission of the department, full-time teaching for a semester, accompanied by Education 315. Students carrying Education 216 for credit toward a master's degree will be required to take six hours of senior or graduate work in addition to the normal degree requirements. 6 units. *Cartwright, Githens, Hurlburt, Johnson, and Shuman*

217. The Psychological Principles of Education. An advanced study of

*Offered on demand.

teaching, learning, and the learner. Selected problems guiding the reading of students will be discussed in class. 3 units. *Davis, Gehman, and Weitz*

218. Comparative and International Education: Developing Societies. A study of the structure and functioning of educational institutions and processes in selected developing nations. Emphasis is placed on the application of relevant social science theory and methods of the problems of education. 3 units. *DiBona*

219. Comparative and International Education: South Asia. Traditional and modern educational developments are studied in the cultural context of the region. Emphasis is placed on the social, political, and economic consequences of schooling in India and Pakistan. 3 units. *DiBona*

221. Programs in Early Childhood Education. This course is designed to examine the objectives and philosophy underlying the establishment of programs in early childhood education. It will include an overview of existing practices, research findings and experimental projects dealing with the social, emotional, physical and cognitive development of the young child. 3 units.

222. New Developments in Elementary School Curriculum. Curriculum and materials of the modern elementary school. Special attention is given to innovations such as the open classroom, team teaching, non-graded programs, and individualized instruction. Recent emphasis on early childhood education and the middle school is assessed. Offered in Summer, 1972. 3 units. *Sublett*

***223. Teaching the Language Arts.** Comparison of current methods and materials in the teaching of handwriting, spelling, and oral and written composition. Analysis and correction of basic difficulties. Increasing opportunities for creative expression. Correlation of language arts with other activities and school subjects. 3 units. *Adams*

225. The Teaching of History and the Social Sciences. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social sciences. Offered in summer session. 3 units. *Cartwright*

226. Teaching Reading in the Elementary School. A study of the nature of the reading process and of principles, methods, and materials for the developmental and remedial programs. 3 units. *Adams*

227. The Teaching of Geography. 3 units.

229. Formal and Informal Classroom Diagnosis of Reading Disability Cases. Designed to acquaint teachers, supervisors, and administrators with various standardized tests, other instruments, and informal procedures utilized in diagnosing reading problems of elementary and secondary pupils. 3 units. *Adams*

233. Improvement of Instruction in English. This course will acquaint the student with recent developments in the teaching of English and will introduce him to research techniques in the field. Each student will pursue an extensive independent study based on his particular interests. 3 units. *Shuman*

234. Secondary-School Organization and Administration. This course is designed especially for principals, teachers, and other prospective members of the

*Offered on demand.

secondary-school staff. The scope of secondary education is considered to encompass junior high school, regular high school, senior high, and junior college. Special treatment is given to the problems of internal organization and management. 3 units. *Pittillo*

236. Teaching Reading in the Secondary Schools. A study of the nature of the reading process and of principles, methods, and materials for the development of effective reading attitudes and skills as applied both to developmental and remedial programs. For secondary-school teachers of all subjects who wish to improve the reading and study habits of their students. 3 units. *Adams*

237. The Teaching of Literature in Secondary Schools. This course surveys the literature generally taught in secondary schools. Both adult and transition-type literature are considered. Methods of organizing the program and of teaching literature are explored. 3 units. *Shuman*

238. Content, Supervision, and Administration of Reading Programs. The nature and functions of the objectives of various reading programs, organization of such programs, their major attributes, and their evaluation. For supervisors, teachers, and administrators. 3 units. *Adams*

239. The Teaching of Grammar, Composition, Mechanics, and Usage in Secondary Schools. This course will be concerned with recent developments in the teaching of grammar, composition, mechanics, and usage. Students will write and grade compositions. Each student will undertake an appropriate term project. 3 units. *Bowman and Shuman*

240. Career Development. Educational, psychological, and sociological origins of individual career development; theories of career development and placement of job choice in general human growth and development; use of occupational and educational information. 3 units. *Ballantyne and Colver*

241. Principles of Guidance and Student Personnel Work. A study of the history, philosophy, principles, and scope of guidance work in elementary and secondary education and student personnel work in higher education. 3 units. *Ballantyne and Colver*

243. Personality Dynamics. A study of personality structure and dynamics with emphasis upon the implications for counseling and instruction. Prerequisite: six hours of psychology or educational psychology. 3 units. *S. Gehman*

244. Counseling Techniques. A study of individual counseling techniques including diagnosis, interviewing, program planning, and counseling evaluation. Prerequisites: Education 243 and 258 or equivalent, which may be taken concurrently. 3 units. *S. Gehman*

245. Theories of Counseling. A study of the major theories of counseling. 3 units. *Weitz*

246. The Teaching of Mathematics. This course deals with such topics as aims, curriculum, course and lesson planning, and classroom procedure for teaching secondary-school mathematics. 3 units.

247, 248. Practicum in Counseling. Practice in individual counseling, including test administration, intake interviewing, diagnosis, counseling, program planning, report preparation, and evaluation. The student will be expected to devote about 150 hours to case work and conferences with his supervisor. Prerequisite: Education 244. 3 units per semester. *Staff*

249. Exceptional Children. A survey of the major categories of exceptional children, mental retardation, emotional disturbance, brain injured, learning disabilities, physically handicapped, visual and auditory deficits, culturally deprived, and gifted. Etiology (biological and environmental factors), diagnosis, and treatment will be discussed. 3 units. *Erickson*

250, 251. Teaching Emotionally Disturbed Children: Internship. Basic principles and practices in teaching and the organization of instructional materials. Work with children under the supervision of a certified teacher of emotionally disturbed children. Experience in general classroom teaching and small group and individualized instruction. Participation in staff conferences involving psychiatrists, psychologists, social case workers, and professional educators. 3 units per semester. *I. Gehman*

***252. The School in the Legal Structure.** Designed to show the legal relationships of the school to federal, state, and local governments. Considerable attention to legal rights, responsibilities, and liabilities of the teacher. 3 units. *Martin*

253. Law and Education. The elements and problems of educational organization which have come within the purview of constitutional and legislative provisions and appellate court decisions. 3 units. *Martin*

255. Assessment of Abilities. A study of the selection, use, and interpretation of various types of instruments for predicting and evaluating the outcome of educational experiences including surveys of standardized tests of aptitude and achievement. 3 units. *Colver*

256. Classroom Assessment of Student Achievement. A study of the techniques to be used by classroom teachers in the evaluation of student progress. Special emphasis will be directed to teacher-made tests. 3 units. *Colver*

258. Assessment of Personality, Interests, and Attitudes. A study of the rationale, construction, use, and interpretation of standardized instruments designed for the assessment of students' interests, attitudes, and personality. Special emphasis will be directed to the use of these instruments in counseling. Prerequisites: Education 243 and 255, or approval of instructor. 3 units. *Colver and Weit*

260. Introduction to Educational Research. Research methodologies: experimental, historical, survey, philosophic, and case study. Fundamentals of statistical inference, research design, and computer applications to research problems. 3 units. *Katzenmeyer*

261. Intermediate Educational Research. Intermediate topics in statistical inference. Analysis of covariance and multiple regression. Computer applications

* Offered on demand.

in research. Research design. Prerequisite: Education 260 or its equivalent. 3 units. *Katzenmeyer*

***266. Science in the Elementary School.** Presentation of basic concepts in natural and physical science through selected readings, the use of simple experiments and demonstrations, construction and use of equipment, and field studies. 3 units. *Githens*

270. The Junior College. A study of the history and role of the junior college, and of problems and issues confronting the two-year college. Designed as an introduction to the junior college for students preparing to be teachers or administrators. 3 units. *Roueché*

276. The Teaching of High-School Science. Discussion, lectures, and collateral reading, related to such topics as aims, tests, curriculum, classroom and laboratory procedure, field trips, and course and lesson planning for secondary-school science. 3 units. *Githens*

291. Public and Community Relations of Schools. A study of the relationships between the entire school or school system and the several publics, especially to the community of a given school. Media for interpreting needs and views of the school to the public and vice-versa will be explored. Both public and private schools studied. 3 units.

For Graduates

300. Individual Assessment of Intelligence. A study of theories of individual intelligence testing with emphasis on the Stanford-Binet and Wechsler. Supervised practice in administering, scoring, and interpreting. Prerequisite: Education 255. 3 units.

306. Seminar in Philosophical Analysis of Educational Concepts. Selected writings of contemporary philosophers, with special emphasis on such educational concepts as teaching, learning, knowing, understanding, indoctrination, explanation, and education. 3 units. *Carbone*

311. Group Counseling. A study of theories and techniques of counseling for small groups of children, adolescents, teachers, parents, and other adults. Simulated practice through recorded interviews, transcribed counseling sessions. Prerequisites: Education 244 and Education 245. 3 units. *Gehman*

313. Seminar in Education and Public Policy. The relationship of educational administration to the public policy process. (Also listed as Political Science 313.) 3 units. *Leach and Pittillo*

315. Seminar in Secondary-School Teaching. Advanced-level consideration of principles, practices, and problems in secondary-school instruction. Designed particularly to accompany an internship. For students without previous internship credit, this course must be accompanied by Education 216. 3 units. *Carbone, Hurlburt, and Johnson*

*Offered on demand.

321. Educational Management. A study of theory and practice of management as applied to education. This course is intended for anyone who has or is preparing to have major management responsibilities in the field of education. 3 units. *Pittillo*

322. Planning and Management of Educational Facilities. A study of planning and management of educational facilities and equipment. This course is intended for teachers, administrators, and supervisors. 3 units. *Pittillo*

***323. Public School Finance.** A study of educational costs, sources of revenue for the support of public education, collection of revenue, basis of distribution, and accounting for funds spent. 3 units. *Pittillo*

332. Supervision of Instruction. A study of the nature of supervision, underlying principles, and techniques of working with individual teachers and with groups. 3 units. *Hurlburt*

333. Seminar in Higher Education. An examination of current problems in American higher education, with special emphasis on case studies in organization, administration, and evaluation. For graduate students interested in the administration of higher education or college teaching with consent of the instructor. 3 units. *Hopkins*

335, 336. Seminar in School Administration. Organization and control over public education. First semester: attention to governance of education as exercised by the different branches and levels of government. Second semester: administrative organization. 3 units per semester. *Hurlburt, Petty, Pittillo, and Sublett*

337. Seminar in Community College Organization. Discussion of the nature, function, and organization of community colleges. Research, writing, and reporting on selected problems. 3 units. *Hurlburt*

338. Seminar in Educational Supervision. Open to students who have completed Education 332 or its equivalent. 3 units. *Hurlburt*

339. Seminar in Curriculum. Research, writing, and reporting on selected problems. 3 units. *Cartwright and Sublett*

340. Seminar in Social Studies Curriculum. Research, writing, and reporting on selected problems. 3 units. *Cartwright*

341. Seminar in Elementary School Curriculum. Research, writing, and reporting on selected problems. 3 units. *Sublett*

342. Seminar in Secondary School Curriculum. Research, writing, and reporting on selected problems. 3 units. *Cartwright*

343. History of Higher Education in America. A history of the growth and development of higher education in the United States from 1636 to the present. The early role of religious groups in establishing colleges, the continuing role of private higher education, and the evolutionary development of public higher education, including state and land-grant universities, teachers colleges, state colleges, and community colleges, are stressed. 3 units.

*Offered on demand.

344. Research in Higher Education. Review of theory, practice, and contribution of research as an aid in understanding the functioning of institutions of higher education. Emphasis on empirical studies utilizing the approach and methods of social science. Also specific concern with historical, economic, and philosophical approaches. Will consider new or emerging frontiers of study such as channels of access to higher education, assessment of the learning environment, attitudinal changes in college students, and contributions of the college to societal needs. 3 units.

345. Seminar in Reading Instruction and Research. A study of the major problem areas in contemporary reading teaching, with emphasis on theoretical, historical, and philosophical contributions to the formulation of objectives and methodologies in modern reading instruction. 3 units. *Adams*

348, 349. Seminar in Child Psychopathology. Under the direction of a child psychiatrist, the student will select one elementary school age child for a psychoanalytic study of neurotic conflicts, unconscious motivations, dream work, defense mechanisms, and transference phenomena. Prerequisite: permission of instructor. 3 units per semester. *Fowler*

350, 351. Directed Activities in Education. Selected internship experiences at an advanced level under supervision of appropriate staff. Prerequisite: approval of instructor. 3 units per semester. *Staff*

354. Seminar in Law and Educational Organization. Research, writing, and reporting on selected problems. Prerequisites: Education 204 and 253, or by consent of instructor. 3 units. *Martin*

360. Seminar on Instructional Strategies. This seminar will present various theoretical and analytical models for comprehending teacher instructional strategies and teacher-student interaction in regard to their influence on the learning process. Students will review relevant research, analyze tapescripts and videotapes of classroom performance, and pursue applications of the models in a variety of settings. 3 units. *Katzenmeyer*

Engineering

George Wilbur Pearsall, Sc.D., *Dean* (136 Engineering)

The School of Engineering offers programs of study and research leading to the degrees of Master of Science and Doctor of Philosophy with a major in biomedical, civil, electrical, or mechanical engineering. These programs are designed to provide a fundamental understanding of the science of engineering, which is based on mathematics and the physical sciences, and to develop experience in the art of engineering, which depends on human imagination and judgment. Each engineering graduate student may participate in seminars appropriate to his field of study.

A *minimum* of 30 units of earned graduate credit beyond the bachelor's degree is required for the M.S. degree: 12 in the major, 6 in related minor work (normally mathematics or natural science), 6 in either the major or minor subject or in other areas approved by the major department and the Dean of the School of

Engineering, and 6 for a research-based thesis. A non-thesis option requiring 30 units of course credit is available. Each of the departments imposes additional requirements in the exercise of this option. There is no language requirement for this degree.

A minimum of 60 units of earned graduate credit beyond the bachelor's degree is required for the Ph.D. degree: 24 in the major, 12 in related minor work (normally mathematics or natural science), 12 in either the major or minor subject or other areas approved by the major department and the Dean of the School of Engineering, and 12 for a research-based dissertation. In addition, a reading knowledge of one foreign language which is relevant to the field of the dissertation is required (normally French, German, or Russian) in civil and mechanical engineering. The language requirement may be waived under certain circumstances. The directors of graduate studies will, during the first period of full-time registration of each doctoral aspirant, appoint a program advisory committee consisting of three members of the graduate faculty in areas relevant to the student's intended major. The preliminary examination may be either written, oral, or a combination of written and oral components, at the discretion of the committee and the department.

BIOMEDICAL ENGINEERING

Professor Pilkington, *Chairman*; Professor Thurstone, *Director of Graduate Studies*; Associate Professors Clark, Hills, Nolte, and Wachtel; Assistant Professors Barr and Hammond; Lecturer Wolbarsht

Biomedical engineering is often defined as the application of the concepts and methods of the physical, mathematical, and engineering sciences to biology and medicine. The definition covers a broad spectrum ranging from formalized mathematical theory through experimental science to practical clinical applications. The purpose of the graduate program in biomedical engineering is to encourage the optimum combining of engineering and biomedical course work with an interdisciplinary research topic so that the graduates of this program can contribute at the most advanced professional level to the interdisciplinary field of biomedical engineering. The major research areas available include: biomechanics; biomedical materials; biomedical modeling; data acquisition and processing; and electrophysiology.

201. Introductory Biomedical Engineering I. Fundamentals of biomedical engineering, with particular emphasis on cellular, neural, circulatory, and respiratory phenomena and their representation by analytical models. 4 units. *Hammond, Pilkington, and Wachtel*

202. Introductory Biomedical Engineering II. A continuation of Biomedical Engineering 201, with particular emphasis on biological interactions of artificial materials and prostheses, environmental studies and hyperbaric exposure, and instrumentation related to biomedical data acquisition and processing. Prerequisite: Biomedical Engineering 201. 3 units. *Clark, Hammond, and Hills*

265. Advanced Topics in Biomedical Engineering. Advanced subjects related to programs within biomedical engineering, tailored to fit the requirements of

a small group. Prerequisite: approval of the chairman and the instructor under whom work will be done. 1 to 4 units. *Staff*

311. Inverse Biomedical Models. Analytical and computational methods for determining the internal state of a biological system from a set of external measurements and a priori characterization of the system. Differences and integral equation formulations of volume conductor problems, variational methods, perturbation techniques, eigenvalue problems, and quasilinearization. Particular emphasis is placed on the inherent limitations and difficulties encountered in obtaining numerical solutions from inverse formulations and the value of constraints in reducing these difficulties. (Also listed as Computer Science 311.) 3 units. *Pilkington*

323. Biomedical Materials and Artificial Organs. The use of artificial organs to replace or augment natural function in pumping and oxygenation of blood, removal of nitrogenous wastes and other toxins, and prostheses which have mechanical, chemical, or cosmetic function. Emphasis is placed on molecular architecture of materials for use in biological environment and optimization of parameters of materials which determine their utility in varying applications. 3 units. *Clark*

333. Biomedical Imaging. A study of the fundamentals of information detection, processing, and presentation associated with imaging in biology and medicine. Analysis of coherent and incoherent radiation and various image generation techniques. Also covered will be the psychometrics of image evaluation dealing with subjective and objective parameters. Emphasis will be placed upon sonography, thermography, X-ray, various forms of nuclear radiography, microscopy, and holography. 3 units. *Thurstone*

399. Special Readings in Biomedical Engineering. Individual readings in advanced study and research areas of biomedical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units per semester. *Graduate Staff*

CIVIL ENGINEERING

Professor Vesic, *Chairman* (121 Engineering); Associate Professor Muga, *Director of Graduate Studies* (118-I Engineering); Professors Brown and Meriam; Associate Professors Dvorak, Palmer, Utku, and J. Wilson; Assistant Professors Clough, Dajani, and Vesilind

A student may specialize in one of the following fields of study for either the M.S. or the Ph.D. degree with a major in civil engineering: engineering mechanics, structural engineering, soil mechanics and geotechnical engineering, fluid mechanics and ocean engineering, materials science and engineering, environmental engineering, and urban systems and transportation engineering. Programs combining study in some of these areas with business administration, social sciences, and other areas of engineering are also available. Each graduate student participates in seminars appropriate to his field of study.

With the approval of the department, a master's degree candidate in civil engineering may choose, in lieu of submitting a thesis, to complete an additional 6 units of course work plus a special project. If the candidate elects this alternative, he is expected to take a comprehensive examination over his graduate course work, and also to defend orally his special project.

The candidate for the Ph.D. degree must have a reading knowledge of one foreign language. Normally, this is French, German, Russian, or Spanish, but other languages may be considered by petition to the department.

Under the Reciprocal Agreement with the Consolidated University of North Carolina, a student may include as a portion of the minimum requirements work offered by the Department of Environmental Sciences and Engineering of the University of North Carolina. Although minor work normally is taken in the natural sciences or mathematics, a student whose major interest relates to the social or managerial sciences may take relevant minor work in these areas.

A minimum prerequisite to the graduate program in civil engineering is a basic knowledge of mathematics through linear differential equations, materials science, solid mechanics, and fluid mechanics.

201. Advanced Mechanics of Solids. Cartesian tensors. Analysis of states of stress and strain, field equations. Constitutive relations for elastic, viscoelastic, and elastic-plastic solids. Energy principles. Virtual work techniques, limit analysis. The correspondence principle. Application to bars, beams, shafts, beams on elastic foundations, and pressure vessels. Simple torsion and plane problems. Corequisite: Mathematics 285 or equivalent. 3 units. *Dvorak*

202. Experimental Mechanics. Experimental analysis of stress and strain; correlation of theory with experimental data; errors; photoelasticity; strain gages; brittle lacquers; similitude principles and design of models; dynamic measurements. 3 units. *Wilson*

203. Elastic Stability. Linear buckling problems of structures in continuum such as bars, rings, beams, curved beams, thin plates, and thin shells. Linear buckling of structures in discrete space, such as trusses, frames, and discrete representations of plates and shells. Differential equation formulations versus extremum formulations in linear buckling problems. Systematic treatment of buckling problems as linear eigenvalue problems in discrete space and in continuum. Numerical methods for eigenvalue extraction. 3 units. *Utku and Wilson*

204. Plates and Shells. Formulation of linear equilibrium problems of Kirchhoffian and non-Kirchhoffian thin plates of isotropic and orthotropic material. Solutions in terms of previously tabulated functions. Finite difference methods. Extremum formulation of the plate problem. Finite difference and finite element methods as applied to the extremum formulation. Folded plates. Numerical solution methods for the folded plates. Membrane theory of thin shells. 3 units. *Utku*

***205. Elasticity.** Introduction to linear theory of elasticity. Constitutive equations for anisotropic and isotropic elastic solids. Formulation and solution of torsion, bending and plane problems by semi-inverse, complex potential, and variational methods. Three-dimensional problems. Prerequisite: Civil Engineering 201 or equivalent. 3 units. *Dvorak*

211. Mechanical Behavior of Materials. Mechanical behavior and its relationship to microstructural deformation and fracture processes in polycrystalline, polymeric, and composite materials. Influence of temperature, strain rate, and environmental conditions on material behavior. Fracture mechanics and its appli-

*Not offered in 1972-73.

cation to brittle and ductile fracture, and fatigue in structural metals, polymers, composites, and concrete. Prerequisite: CE 201. 3 units. *Dvorak*

217. Urban Systems Analysis. Quantitative approaches to the analysis of public services, activities and facilities. Model building. Demand forecasting, cost, performance and impact models. Planning methodologies and system evaluation techniques. Optimization of urban and regional systems. Emphasis on transportation, housing, land-use and public utilities and services. Prerequisites: CE 117, and Engineering 168 or equivalent. 3 units. *Dajani*

221. Incompressible Fluid Flow. Steady and unsteady pipe flow, theories of turbulent flow; water hammer theory and control; surge tanks; air chambers; the analysis and control of fluid systems; effect of resistance; tapered conductors. 3 units. *Muga*

222. Open-Channel Flow. Basic principles. Selected flow problems and practical solutions; gutter and inlet flows, flow over spillways, and flow into estuaries and bays. Design of open channel structures, river hydraulics. Design of flood control and navigation structures; culverts, bridge openings, and energy dissipators. 3 units. *Muga*

***223. Flow Through Porous Media.** Theory of miscible and immiscible fluid displacement processes. Derivations and solution methods. Selected problems in stability, fingering and capillarity. Applications; saline water intrusion, secondary recovery processes, seepage through earthen dams, dewatering of construction sites, well point operation. 3 units. *Muga*

***224. Coastal and Tidal Hydraulics.** Basic analytical concepts; wave phenomena, theory of surface water wave motion, wave modification, wave spectra. Selected problems; harbor seiching, moorings, coastal protective works, breakwater, and pier design. 3 units. *Muga*

***225. Engineering Hydrology.** Study of processes governing the origin, distribution, depletion, and replenishment of water resources and application of this knowledge to the solution of water supply and drainage problems. Topics include the hydrologic cycle, hydrometeorology, precipitation, runoff, hydrograph analysis, evapotranspiration, infiltration, groundwater, runoff, stream flow groundwater recharge, and hydrologic measurements. 3 units. *Muga and Vesilind*

***230. Matrix Methods for Structural Analysis.** A study of the displacement method of structural analysis and the use of matrices in the analysis of rigid frames and trusses; applications to multispans and multistory frames and space trusses. Computer solutions are emphasized. Prerequisite: Civil Engineering 140. 3 units. *Brown*

231. Structural Engineering Analysis. A study in depth of a number of "classical" topics in structural analysis; elastic arch design, plasticity and limit design; numerical and approximate methods; stiffness and flexibility methods are included. Prerequisite: Civil Engineering 140. 3 units. *Brown*

*Not offered in 1972-73.

***232. Reinforced Concrete Design.** A critical review of research related to the development of existing codes. Special attention is given to the consideration of temperature change effects, shrinkage, plastic flow, bond, shear and diagonal tension. Two-way slabs and flat plates design. 3 units. *Brown*

233. Prestressed Concrete Design. A critical review of research and recent developments in prestressed concrete design. Prestressed tanks, beams and columns, partially prestressing and composite design. 3 units. *Brown*

234. Structural Design in Metals. Design of metal structures using both elastic and plastic theories. Application to plate girders, bridge trusses, and building frames. Interpretation and justification of building codes and specifications. Planning, preliminary design, and organization of design procedures. 3 units. *Palmer*

***235. Foundation Engineering.** An introduction to methods of analysis, design and construction of foundations. Bearing capacity and settlement of shallow and deep foundations. Soil exploration; excavation and bracing; drainage and stabilization; underpinning. Foundation vibrations. 3 units. *Clough and Vesic*

236. Earth Structures. An introduction to methods of analysis, design, and construction of earth structures, such as dams, embankments, cuts, canals, and airfield and highway pavements. Selection of materials, soil compaction, and stabilization. Theory of seepage, design of wells, and drainage collectors. Slope stability and related problems. Theory of layered systems and pavement design procedures. 3 units. *Clough and Vesic*

243, 244. Sanitary Engineering Unit Operations and Process Design. Fundamental bases for design of water and waste treatment systems, including transport, mixing, sedimentation and filtration, gas transfer, coagulation, and biotreatment processes. 3 units per semester. *Vesilind*

247. Air Pollution Control. The problem of air pollution, with reference to chemical and biological effects. Measurement and meteorology of air pollution. Air pollution control methods. Noise pollution, odor and air pollution law. 3 units. *Vesilind*

248. Solid Waste Management. Collection, treatment, and disposal of solid wastes from wastewater treatment. Filtration and centrifugation theory and application. Pumping of solid-liquid mixtures. Sludge conditioning by chemicals and heat. Sludge combustion, pyrolysis, and drying. Treatment of solids from air pollution control devices. Application of systems analysis to collection of municipal refuse. Sanitary landfills and incineration of solid wastes. Reuse and recycling of solid wastes, including paper, plastics, aluminum and petroleum products. Prerequisite: CE 124 or consent of instructor. 3 units. *Vesilind*

250. Engineering Analysis. Formulation of mathematical models for a wide variety of problems selected from the several fields of engineering, economics and management science; system optimization; use of higher mathematics including infinite series, finite difference calculus, energy methods and also digital computers as problem-solving techniques. 3 units. *Wilson*

*Not offered in 1972-73.

***304. Advanced Plates and Shells.** Differential equation formulation of the thin shell problems in general curvilinear coordinates; membrane and bending theories; specialization for shallow shells, shells of revolution and plates. Solution methods in terms of previously tabulated functions; asymptotic integration method; Geckeler's approximation. Finite difference methods as applied to the differential equation formulation. Extremum formulation of the thin shell problems. Numerical solution methods starting from the extremum formulation of the problem. Treatment of nonlinear behavior of shells. Prerequisite: CE 204. 3 units. *Utku*

***305. Advanced Elasticity.** Complex variable methods in theoretical elasticity; stress, displacement, and mixed boundary value problems in plane strain and longitudinal shear (antiplane strain); axial symmetry. Dynamic boundary value problems; moving loads, punches, and cracks. Prerequisite: Civil Engineering 205 and Mathematics 286. 3 units. *Dvorak*

306. Plasticity. Time-dependent and time-independent inelastic material behavior. Stability, yield conditions and yield surfaces, normality and convexity in stress space. Plastic flow, work hardening, unloading, shakedown. Incremental and deformation theories of plasticity. Uniqueness of solutions. Elastic-plastic problems for cylindrical tubes and spherical shells, torsion of prismatic bars. Rigid-perfectly plastic solids. Lower and upper bounds, theorems of limit analysis. Theory of slipline fields. Application to problems in plane strain and in three-dimensions. Prerequisite: Civil Engineering 205. 3 units. *Dvorak*

***307. Viscoelasticity.** Models and definitions of linear viscoelastic solids, viscoelastic functions and their interrelations. Correspondence principle. Three-dimensional viscoelasticity, solution of boundary value problems. Waves, vibration and pulse propagation in viscoelastic rods and beams. Beams on viscoelastic foundations under moving loads. Experimental methods in viscoelasticity. Prerequisite: Civil Engineering 205 or equivalent. 3 units. *Dvorak*

309. Advanced Structural Dynamics. Dynamic stability and the vibrations of discrete and continuous systems; conservative and non-conservative systems; parametric excitation; Lyapunov's theorems; random excitation. 3 units. *Wilson*

321. Mechanics of Ideal Fluids. Basic equations of ideal fluid flow; potential and stream functions; vortex dynamics; body forces due to flow of fluids; methods of singularities in two-dimensional flows; analytical determination of potential functions; conformal transformations; free-streamline flows. Prerequisite: Mathematics 286 or equivalent. 3 units. *Muga*

331. Advanced Structural Analysis I. Basic theory of elasticity. Energy theorems. Basic procedures of the displacement method; connectivity matrix, representation of the essential boundary conditions, properties of the elemental matrices, general assembly algorithms. Stiffness matrices and load vectors for line elements, 2- and 3-dimensional elasticity elements, plate and shell elements, solids of revolution elements, and shells of revolution elements. Various specializations of the general upper-lower procedure for symmetric positive definite systems. Computation of stresses in the displacement method. 3 units. *Utku*

*Not offered in 1972-73.

332. Advanced Structural Analysis II. Basic procedures of the force method, equilibrium equations as constraint equations, structure cutter in choosing a basis in the constraint equations, properties of the elemental matrices, some examples of the element flexibility matrices for various elements. Nonlinear equilibrium problems of structures, incremental load technique. Geometric stiffness matrices for finite elements. Treatment of the general linear buckling problems of the structures. Mass matrices for finite elements. Free vibration problems of initially stressed and unstressed structures. Methods of eigenvalue extraction in positive definite and symmetric systems. Response of structures to deterministic and random dynamic excitations. 3 units. *Utku*

***335. Mechanical Behavior of Soils.** Origin of soils, soil minerals, and processes of soil formation; physical chemistry of multiphase systems and soil structure. Permeability and flow of water through soils: capillary and osmotic phenomena; soil compressibility; theory of consolidation; shear strength and failure criteria. Stress-strain relationships, volume changes and pore pressures during shear, strength properties. Advanced laboratory soil testing techniques. 4 units. *Clough and Vesic*

336. Advanced Soil Mechanics. Theories of plastic and elastic equilibrium of soil masses and their application to analysis of problems such as pressure on retaining walls, anchored bulkheads, cofferdams, silos, shafts, tunnels; stability of slopes; stresses and settlement in soil masses and pavement, piles and pile groups subjected to lateral loads. Prerequisite: Civil Engineering 335. 4 units. *Vesic*

337. Elements of Soil Dynamics. Behavior of soils and foundations under transient and impact loads. Mechanics of pile driving. Foundation vibrations. Effects of explosions on soils: wave propagation, cratering. Earthquake effects on foundations, earth dams, and slopes. Compaction of loose soils by explosives or by vibration. Behavior of layered systems under dynamic loads. Prerequisite: Civil Engineering 335 or consent of instructor. 3 units. *Clough and Vesic*

***338. Rock Mechanics.** Behavior and properties of rock as an engineering material; failure of rock. Design and construction of underground structures and slopes in rock; design of rock abutments for dams. Laboratory and field rock testing techniques. 4 units. *Clough*

350. Advanced Engineering Analysis. Review of general mathematical properties of boundary value, eigenvalue and initial value problems in continuum and in discrete space; approximate methods for reducing continuum problems into discrete problems, and comparison of such methods; discussion and comparison of solution algorithms for discrete problems; truncation and round-off errors, and error analysis. 3 units. *Utku*

365. Advanced Topics in Civil Engineering. Opportunity for study of advanced subjects relating to programs within the Civil Engineering Department tailored to fit the requirements of a small group. 1 to 3 units. *Graduate Staff*

399. Special Readings in Civil Engineering. Special individual readings in a specific area of study in Civil Engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Graduate Staff*

*Not offered in 1972-73.

ELECTRICAL ENGINEERING

Professor H. Owen, *Chairman* (130 Engineering); Professor Artley, *Director of Graduate Studies* (04A Engineering); Professors Kerr, Meier, Pilkington, Thurstone, and Wilson; Associate Professors Hacker, Joines, Marinos, Nolte, Wang, and Wells; Assistant Professor George; Visiting Professor Trickey; Adjunct Associate Professor Burger

A student may specialize in any one of the following fields in working toward either the M.S. or the Ph.D. degree with a major in electrical engineering: solid-state materials and devices; ferromagnetics; super-conducting circuits; instrumentation; electronics; microwaves; automatic control; energy conversion; digital systems; stochastic systems; information processing; and biomedical engineering.

A minimum prerequisite to the graduate courses in electrical engineering is a basic knowledge of differential equations, electric and magnetic field theory, and the theory of networks. A previous course in modern physics is recommended. There is no foreign language requirement. A qualifying examination is required for the Ph.D. program.

A program in stochastic system analysis is offered in cooperation with the Department of Mathematics at Duke and the Departments of Statistics and Mathematics at the University of North Carolina at Chapel Hill. For further details concerning this program, refer to the description under Special and Cooperative Programs.

For Seniors and Graduates

203. Random Signals and Noise. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory: joint, conditional, and marginal distributions; random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting filters. Introduction to optimum signal detection and parameter estimation. (Also listed as Computer Science 203.) Fall semester. 3 units. *Kerr and Nolte*

204. Information Theory and Communication Systems. Information and entropy and their application in communication situations. Noise and channel capacity, coding, and the fundamental theorem of information theory. Continuous channels and transmission of band-limited signals. Comparisons of various practical modulation techniques from the standpoint of information rate and error probability. Prerequisite: Electrical Engineering 203. Spring semesters 1974, 1976. 3 units. *Nolte*

205. Signal Detection and Extraction Theory. Introduction to signal detection and information-extraction theory from a statistical decision theory viewpoint. Subject areas covered within the context of a digital environment are decision theory, detection and estimation of known and random signals in noise, estimation of parameters and adaptive recursive digital filtering, and decision processes with finite memory. Application to problems in communication theory. Prerequisite: Electrical Engineering 203 or permission of instructor. (Also listed as Computer Science 205.) Spring semester. 3 units. *Nolte*

208. Digital Computer Design. Fundamentals of digital computer design. Digital arithmetic; hardware implementation of combinational and sequential logic circuits—adders, multipliers, switching matrices, shift registers, counters, comparators, and character generators. Detailed design of a simple digital computer system. Selected laboratory work. Prerequisite: Electrical Engineering 157, or permission of instructor. (Also listed as Computer Science 208.) Spring semesters 1973, 1975. 3 units. *Marinos and Owen*

211. Solid State Theory. The fundamental theory of wave motion in solids. Wave mechanics; variational methods; perturbation theory; many-electron problems; one-electron approximation; free-electron approximation; electron spin; Brillouin zones; time-dependent Schrödinger's equation; and transition probabilities. Introduction to thermostatics and statistical mechanics. Prerequisite: permission of instructor. Fall semester. 3 units. *Artley and Hacker*

212. Solid State Materials. Concepts of solid state physics as applied to engineering materials; electric, magnetic, thermal, and mechanical properties of solids; dielectrics; semiconductors; magnetic materials; and superconductors. Selected laboratory work. Prerequisite: Electrical Engineering 211. Spring semester 1974. 3 units. *Artley and Hacker*

213. Principles of Magnetism. Classical field theory of quantum mechanical descriptions of magnetic properties of materials. Diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, and ferrimagnetism. Resonance and relaxation in magnetic materials. Anisotropy, magnetostriction, domain theory, and switching properties. Selected topics to relate theory of magnetism to applications of engineering interest. Prerequisite: Electrical Engineering 211 or permission of instructor. Spring semesters 1973, 1975. 3 units. *Artley and Hacker*

215. Semiconductor Physics. A quantitative treatment of the physical processes that underlie semiconductor device operation. Topics include: band theory and conduction phenomena equilibrium and nonequilibrium charge carrier densities; charge generation, injection, and recombination; drift and diffusion processes; low and high field conduction. Prerequisite: Electrical Engineering 211 or permission of instructor. 3 units. *Staff*

217. Masers. Principles of masers, particularly optical masers. Discussion of quantum electronics, optical configuration; solid state, gaseous, and liquid devices; modulation; high power operation. Prerequisite: permission of the instructor. Two class sessions and laboratory. Spring semesters 1973, 1975. 3 units. *George*

222. Nonlinear Analysis. Introduction to methods of analyzing engineering systems described by nonlinear differential equations—analytic, numerical, graphical, and series approximation methods; analysis of singular points; stability of nonlinear systems. Applications of various methods, such as the modified Euler, Runge-Kutta, isoclines, perturbation, reversion, variation of parameters, residuals, harmonic balance, Bendixon, and Liapounov to phenomena of nonlinear resonance, subharmonics, relaxation oscillations, and force oscillating systems. (Also listed as Mechanical Engineering 232.) Fall semester. 3 units. *Wilson*

225. Semiconductor Electric Circuits. Analysis and design of electronic

circuits utilizing a variety of static and dynamic models of semiconductor devices. Transistor and other semiconductor device circuit models; bias stability; high frequency and noise models switching characteristics; illustrative semiconductor circuits. Selected laboratory work. Prerequisite: permission of instructor. Spring semester. 3 units. *Joines and Owen*

227. Network Synthesis. Linear network theory, including a review of time and frequency domain analysis; network graphs; network functions and realizability condition; driving point impedance synthesis of passive networks; driving point and transfer specifications; approximation methods. Prerequisite: permission of instructor. Fall semester 1973. 3 units. *George*

242. Modern Control and Dynamic Systems. See course description for Mechanical Engineering 230. (Also listed as Mechanical Engineering 230.) 3 units. *Wright*

243. Advanced Linear Systems Theory. Definition of a linear, dynamical system; mathematical preliminaries including set theory, linear algebra, vector differential and difference equations; concepts of state space and state variables; state-model description, multivariate systems; the basic existence and uniqueness theorem, stability, transfer function, transition matrix and zero-state, zero-input responses of the system; concepts of reachability, controllability, observability and their practical implications. Transformation and equivalence of linear systems. Prerequisite: permission of instructor. Fall semester. 3 units. *Wang*

***259. Advanced Electric Energy Conversion.** Equations of motion of electromechanical systems; fields and lumped parameters, state function concepts; mathematical techniques for analyzing electromechanical devices and systems; transducers; unified treatment employing matrix, tensor, and block-diagram concepts to obtain response under static and dynamic conditions: the generalized rotating machine. Prerequisite: permission of instructor. 3 units. *Trickey*

265. Advanced Topics in Electrical Engineering. Opportunity for study of advanced subjects related to programs within the Electrical Engineering Department tailored to fit the requirements of a small group. Prerequisite: approval of the Director of Graduate Studies and of instructor under whom work will be done. 1 to 3 units. *Staff*

271. Electromagnetic Theory. The classical theory of Maxwell's equations; electrostatics, magnetostatics, boundary value problems including numerical solutions, currents and their interactions, force and energy relations. Prerequisite: permission of instructor. Fall semester. 3 units. *Joines*

272. Applications of Electromagnetic Theory. Propagation of electromagnetic waves in various structures and media; mathematical description of microwave networks, including equivalent circuits and matrix methods; microwave circuit theorems and synthesis techniques. Selected laboratory experiments. Prerequisite: Electrical Engineering 271. Spring semesters 1974, 1976. 3 units. *Joines*

297-298. Thesis Research. 6 units.

*Offered on demand.

For Graduates

304. Estimation, Filtering, and System Identification. Statistical estimation and filtering techniques applied to signal analysis and system identification. Wiener and Kalman filter theory in the estimation of system state variables and system parameters. Statistical treatment of linear random operators and random differential equations. Applications to communications and control, with selected computer exercises. Prerequisite: Electrical Engineering 203. Spring 1974. 3 units. *Kerr*

305. Advanced Applications of Statistical Decision Theory. Optimum modulators and demodulators, comparison of various systems, Gaussian signals in Gaussian noise; sonar-radar problem, representation of narrow band processes, slowly fluctuating targets, optimum receiver for estimating range and Doppler, properties of autocorrelation functions and ambiguity functions, pseudo-random signals, resolution, frequency spreading, reverberation, active sonar, optimum spacetime system, and passive sonar. Prerequisite: Electrical Engineering 205. Fall semesters 1974, 1976. 3 units. *Nolte*

306. Adaptive Detection and Communication Systems. Sequential detection, Wald's sequential probability ratio test, sequential tests of composite hypotheses, deferred decision theory; adaptive systems, nondecision directed and decision-directed measurements, adaptive on-off communications system, transmitted reference systems, detection systems employing the learning feature, learning with and without a teacher, pattern recognition. Applications to communication systems. Prerequisite: Electrical Engineering 205. (Also listed as Computer Science 306.) Fall semesters 1973, 1975. 3 units. *Nolte*

307. Advanced Digital Systems I. A unified treatment of finite-state deterministic systems. Models and elementary properties of sequential machines; sequential machine compatibility; equivalence and state minimization; state assignment for sequential machines; state and machine identification experiments; asynchronous and speed independent switching circuits; theory of regular expressions. Prerequisites: Electrical Engineering 157 or permission of instructor. Fall semesters 1973, 1975. (Also listed as Computer Science 307.) 3 units. *Marinos*

308. Advanced Digital Systems II. A continuation of Electrical Engineering 307. Machine decomposition; design of reliable systems from unreliable components; probabilistic and fuzzy automata; recognition devices; automata and their relation to context-free languages. Prerequisite: Electrical Engineering 307 or permission of instructor. (Also listed as Computer Science 308.) Spring semesters 1974, 1976. 3 units. *Marinos*

311. Quantum Theory of Materials. Concepts of the quantum theory of solids as applied to engineering materials. Topics selected will vary with the interests of the class, but the importance of quantized fields in crystals (phonons, magnons, plasmons, excitons, and polarons) and the interaction of these fields will be stressed. Prerequisites: Electrical Engineering 211 and Physics 316. 3 units. *Staff*

313. Magnetic Processes in Materials. Selected topics in magnetism. Cryomagnetism, spin wave resonance, interaction of superconductor and ferromagnetic

materials, nonlinear spin wave theory, effects of finite dimensions and interfaces on basic properties of ferromagnets. Microwave applications. Prerequisite: Electrical Engineering 213 or permission of instructor. Fall semesters 1973, 1975. 3 units. *Hacker*

315. Semiconductor Devices. Derivation of the d-c and incremental electrical characteristics of p-n junction and junction transistors; equivalent circuit models: parameter determination; implication and limitations of models for describing device operation; thermal runaway; avalanche device operation; thin film, multi-junction and other modern devices. Prerequisite: Electrical Engineering 215. 3 units. *Staff*

321. Nonlinear Magnetic and Semiconductor Circuits. Mathematical description of nonlinear magnetic and semiconductor characteristics; transient and steady-state analysis and synthesis of nonlinear systems with application of such topics as magnetic amplifiers, frequency converters, oscillators, computer logic, switching devices, and inverters. Prerequisite: permission of instructor. Spring semesters 1973, 1975. 3 units. *Wilson*

324. Nonlinear Oscillations in Physical Systems. Analysis of phenomena encountered in free and forced oscillating systems: stability criteria, topological methods, degenerate systems and discontinuous theories, relaxation oscillations, asymptotic approaches. Emphasis on interdependence of physical and mathematical reasoning in analyzing nonlinear electrical and mechanical systems. Illustrative examples selected to meet interests of class. Prerequisite: Electrical Engineering 222. Spring semesters 1974, 1976. 3 units. *Wilson*

342. Optimal Control Theory. The maximum principle of Pontryagin and the Hamilton-Jacobi equation. Properties and design of optimal systems: minimum-time, -fuel, and -energy problems. Optimal linear systems with quadratic criteria. Classical variational theory: The Euler-Lagrange equation, two-point boundary value problems. The problem of Mayer and Bolza, Riccati matrix differential equation. Dynamic programming of Bellman: multistage decision process, principle of optimality and properties of the optimal value function. Selected laboratory work. Prerequisite: Electrical Engineering 243. Spring semesters 1973, 1975. 3 units. *Wang*

345. Stochastic Control Systems. Wiener process, Poisson's processes, Markov chains, stochastic finite-stage machines and semi-Markovian processes. Stochastic control systems, stability of stochastic systems. Mean square error analysis, Wiener filters, statistical equivalent linearization and identification of control systems by statistical techniques. Fixed-memory, expanding-memory, fading-memory filters and Kalman's filters. Stochastic dynamic programming and optimization of stochastic control systems. Prerequisites: Electrical Engineering 203 and 243. Spring semesters 1974, 1976. 3 units. *Wang*

361, 362. Electrical Engineering Seminar-Journal. A weekly seminar in which graduate students and the electrical engineering faculty meet to discuss research and professional activities. Although this carries no graduate credit, it is expected that each graduate student will participate in the seminar for at least two semesters while in residence at Duke University. *Artley*

371. Advanced Electromagnetic Theory. An advanced treatment of topics in electromagnetic theory selected from the interests of the instructor and students. Representative topics are propagation in anisotropic media, plasma waves, antennas, and boundary value problems. Prerequisite: Electrical Engineering 272. Fall semesters 1974, 1976. 3 units. *Artley*

373. Selected Topics in Field Theory. An advanced treatment of topics in generalized field theory selected from the interests of the instructor and the students. Representative topics are generalized fields, electromagnetic interactions, quantum electrodynamics, inhomogeneous media, and diffusion phenomena. Prerequisite: Electrical Engineering 272. Spring semesters 1973, 1975. 3 units. *Artley*

399. Special Readings in Electrical Engineering. Special individual readings in a specified area of study in electrical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Graduate Staff*

MECHANICAL ENGINEERING

Professor Chaddock, *Chairman* (142A Engineering); Assistant Professor Buzzard, *Director of Graduate Studies* (228 Engineering); Professors Harman, Kenyon, Linderoth, Macduff, Meriam, and Pearsall; Associate Professors Clark, Elsevier, and Shepard; Assistant Professors Munson and Wright; Adjunct Associate Professor Murray

Graduate study is available to students seeking the M.S. and Ph.D. degrees with a major in mechanical engineering. Departmental programs of advanced study and research include control systems, dynamics and vibrations, fluid mechanics, heat and mass transport, mechanical design, metallurgy, polymer science, and thermodynamics. The mechanical engineering faculty cooperates with faculty members from a number of other departments and schools to establish interdisciplinary research projects and programs of study in areas which include applied mechanics, biomechanics, biomedical materials, energy conversion, environmental quality and control, interaction of fields and materials, ocean engineering, systems engineering, and transportation systems.

The program includes the opportunity for experimental work as well as theoretical study. An increasing emphasis is placed upon developing the creative abilities of the graduate student and relating the program to the evolving needs of modern engineering practice.

202. Theoretical Thermodynamics. Classical thermodynamics and thermodynamics of continuum properties for real substances, equilibrium, introduction to statistical thermodynamics. 3 units. *Harman*

203. Introduction to Advanced Mechanics. A comprehensive introduction to advanced theory and application in advanced mechanics with emphasis on stability, space kinematics, and kinetics of particles and rigid bodies, generalized motion equations for constant and time-dependent mass systems, and generalized coordinates. Prerequisite: Mechanical Engineering 123 or equivalent. 3 units. *Meriam*

211. Theoretical and Applied Polymer Science. An advanced course in materials science and engineering, dealing specifically with the structure and prop-

erties of polymers. Particular attention to recent developments in the processing and use of modern plastics and fibers. 3 units. *Clark and Pearsall*

214. Environmental Factors in Materials Science. Effects of environments on the design and utilization of modern engineering alloys. Theory and mechanisms of corrosion, particularly in seawater and atmospheric environments. Microstructural aspects of diffusion, oxidation, hot corrosion, and stress corrosion. Prerequisite: Engineering 83. 3 units. *Shepard*

221. Compressible Fluid Flow. The concepts and analysis for flow of gases in subsonic to hypersonic regime. Two-dimensional flow; oblique shocks; experimental techniques. 3 units. *Harman and Munson*

222. Heat Transfer. Steady-state and transient solutions of the general heat conduction equation. Development of the equations for transport of energy by fluid motion. Principle of similarity and dimensional analysis in convective energy transport. Solutions of the boundary layer equations. The laws of radiation heat transfer and radiation heat exchange. 3 units. *Buzzard and Chaddock*

226. Intermediate Fluid Mechanics. A survey of the principal concepts and equations of fluid mechanics. Fluid properties. Statics. Basic equations for the control volume. The differential equations of fluid motion. Stream function. Irrotational flow. Navier-Stokes equations. Kelvin's and Crocco's theorem. Applications to two-dimensional incompressible potential flow and to viscous flow in boundary layers. Prerequisite: Mechanical Engineering 126. 3 units. *Buzzard and Munson*

230. Modern Control and Dynamic Systems. The state-space point of view is used as a vehicle to integrate the classic control and modern systems techniques. Topics include vector differential equations, modal matrix transformation, modified canonical forms, and controllability and observability concepts. Also system stability and mathematical modeling methods for lumped- and distributed-parameter systems. Modal control of multivariable control systems. (Listed also as Electrical Engineering 242.) 3 units. *Wright*

231. Systems Response and Control. Methods, applicable to design, of obtaining parameters for strength, response, and stability studies of mechanical systems. Analysis of closed loop control systems with linear transfer functions; electrical and mechanical analogs; introduction to determination of transfer function from input-output characteristics. 3 units. *Macduff and Wright*

232. Nonlinear Analysis. Introduction to methods of analyzing engineering systems described by nonlinear differential equations: analytic, numerical, graphical, and series approximation methods; analysis of singular points; stability of nonlinear systems. Applications of various methods, such as the modified Euler, Runge-Kutta, isoclines, perturbation, reversion, variation of parameters, residuals, harmonic balance, Bendixon, and Liapounov to phenomena of nonlinear resonance, subharmonics, relaxation oscillations, and forced oscillating systems. (Listed also as Electrical Engineering 222.) Fall semester. 3 units. *Wilson*

233. Fluid Control Systems. A design-oriented course concerned with hydraulic and pneumatic feedback control systems. Basic control system characteristics; linearized transfer functions; determination of transfer function from com-

putation and experiment; position, velocity, and acceleration feedback devices; transducers; DC and AC hydraulic and pneumatic amplifiers. 3 units. *Macduff and Munson*

235. Advanced Mechanical Vibrations. Analytical and experimental procedures applied to design of machines and systems for adequate vibration control. Determination of eigenvalues and eigenvectors by iteration and computer techniques; transfer matrices applied to lumped and distributed systems; analytical and numerical methods of obtaining the pulse response of plane and three dimensional multi-mass systems; convolution and data processing; introduction to random vibration. 3 units. *Macduff*

251. Refrigeration and Cryogenics. Theory and experiment in the evaluation of the thermodynamic properties of refrigerants and cryogenic fluids. Simultaneous heat and mass transfer in refrigeration. Production of low and very low temperatures. Two-phase flow processes. Heat exchange for refrigeration and cryogenic transfer. 3 units. *Chaddock*

255. Energy Conversion. Principles, thermodynamics, and classification of energy conversion devices. Introduction to semi-conductors, thermoelectric generators, photovoltaic generators, thermionic generators, magnetohydrodynamic generators, fuel cells, and other energy conversion devices. 3 units. *Harman*

265. Advanced Topics in Mechanical Engineering. Study of advanced subjects in mechanical engineering tailored to fit the requirements of a small group. Prerequisites: approval of the Director of Graduate Studies and the instructor under whom work will be done. 1 to 3 units. *Graduate Staff*

270. Theory of Lubrication and Bearing Design. A study and analysis of the theory of hydrodynamic and hydrostatic lubrication. An examination of dynamics of bearing loading, bearing design and materials. Properties of lubricants. Students will work on real bearing problems taken from industry, construction equipment, transportation and wherever relative motion is required between adjacent surfaces. 3 units. *Linderoth*

280. Nuclear Reactor Power Cycles. Basic reactor principles and types. Examination of most feasible thermodynamic cycles for use with both stationary and mobile power plants. Consideration of safety shielding, heat transfer, fluid flow and materials problems unique to reactor design. 3 units. *Kenyon*

297-298. Thesis Research. 6 units.

300. Advanced Projects in Mechanical Engineering. This course may be elected by students enrolled in a non-thesis program leading to the Master of Science degree. 3 units. *Graduate Staff*

302. Advanced Thermodynamics. Classical thermodynamics of inherently irreversible processes. Statistical thermodynamic analysis of properties of real substances and processes. Principles of general thermodynamics. 3 units. *Harman*

311. Behavior of Crystalline Solids. An advanced treatment of the dependence of structure on atomic bonding, and of properties on structure in crystalline solids. Crystal structures; phase diagrams and solid-state thermodynamics; physical

properties; mechanical properties; kinetics of thermal treatments. 3 units. *Pearsall and Shepard*

322. Mechanics of Viscous Fluids. Equations of motion for a viscous fluid; general properties and selected solutions of the Navier-Stokes equations; laminar boundary layer equations with selected solutions and approximate techniques; origin of turbulence. 3 units. *Buzzard*

323. Convective Heat Transfer. Models and equations for fluid motion, the general energy equation, and transport properties. Exact, approximate, and boundary layer solutions for laminar flow heat transfer problems. Use of the principle of similarity and analogy in the solution of turbulent flow heat transfer. Two-phase flow, nucleation, boiling, condensation, and simultaneous heat and mass transfer. Prerequisite: Mathematics 285, Mechanical Engineering 222 or equivalent. 3 units. *Chaddock*

324. Conduction and Radiation Heat Transfer. Conduction heat transfer in steady and transient state. Radiation exchange involving absorbing and emitting media including gases and flames, combined conduction and radiation and combined convection and radiation. Exact and approximate methods of solution including separation of variables, transform calculus, numerical procedures and integral and variational methods. Prerequisites: Mathematics 285, Mechanical Engineering 222 or equivalent. 3 units. *Buzzard and Chaddock*

326. Hydrodynamic Stability. An introduction to the field of the stability of fluid motion; theoretical and experimental results. Criteria governing transition from laminar to turbulent or secondary laminar flow. Consideration of small (linear theory) or finite (energy theory) disturbances; thermal instability of fluid layers; two dimensional parallel flow; boundary layer and jet instabilities. 3 units. *Munson*

331. Nonlinear Control Systems. Design of controls for inherently nonlinear systems and the solution of control problems by introduction of nonlinear elements. Stability and optimization. Describing functions and phase-plane techniques for design of nonlinear systems. Parameter analysis. Computer solutions for signal stabilization. Prerequisite: Electrical Engineering 222 or permission of instructor. *Wright*

335. Analytic Methods in Vibrations. Time and frequency domain analysis, generalized coordinates and Lagrange's equations, natural modes of continuous systems, approximate methods, damped systems, introduction to random vibrations. Prerequisite: Mechanical Engineering 235 or permission of instructor. 3 units. *Wright*

372. Finite Element Techniques in Design. Finite element methods applied to design problems in stress analysis; temperature distribution; and flow problems. Derivation of state vectors and transfer matrices for rectangular and triangular elements; accuracy and computation methods; comparison with difference equation methods and available analytical results. 3 units. *Macduff*

399. Special Readings in Mechanical Engineering. Individual readings in

advanced study and research areas of mechanical engineering. Prerequisite: approval of the Director of Graduate Studies. 1 to 3 units. *Graduate Faculty*

English

Professor Ferguson, *Chairman* (323 Allen Building); Professor Lievsay, *Director of Graduate Studies* (315 Allen Building); Professors Anderson, Budd, Duffey, Nygard, Patton, Randall, Reiss, Sanders, Smith, Stevenson, Turner, and Williams; Associate Professors Clubbe, Jackson, Jones, Krueger, Mellow, Monsman, and Strandberg

The department offers graduate work leading to the A.M., M.A.T., and Ph.D. degrees. A statement of the requirements for the Ph.D. degree may be obtained from the Director of Graduate Studies. The department requires a reading knowledge of one modern foreign language for the A.M. degree; for the Ph.D., two languages determined by the student's committee.

For Seniors and Graduates

207, 208. History of the English Language. A survey of the language from Old English to present-day English, taking into consideration developments in phonology, morphology, syntax, and vocabulary. 3 units per semester. *Nygard and Reiss*

209. Present-Day English. A description of present-day American English from the point of view of modern linguistic theory; comparison of traditional and structural grammars; semantic change; the relation of the written to the spoken language; usage. 3 units. *Nygard and Reiss*

210. Old English Literary Tradition. 3 units. *Nygard and Reiss*

212. Middle English Literary Tradition. 3 units. *Nygard and Reiss*

215, 216. Chaucer. Reading and interpretation of *The Canterbury Tales* in the first semester, of *Troilus and Criseyde* and the minor poems in the second. 3 units per semester. *Nygard and Reiss*

221. English Prose of the Sixteenth Century. Readings in the major forms and authors. 3 units. *Lievsay*

222. English Non-Dramatic Poetry of the Sixteenth Century. Extensive select readings from representative types and authors, excluding Spenser. 3 units. *Krueger and Lievsay*

223. Spenser. A study of his works. 3 units. *Lievsay*

224. Shakespeare. The plays. 3 units. *Williams*

225, 226. Tudor and Stuart Drama, 1500-1642. The first semester includes Peele, Lyly, Greene, Kyd, Dekker, Heywood, Chapman, and Marston, with emphasis on Marlowe. The second semester, which emphasizes Jonson, is devoted also to Webster, Beaumont, Fletcher, Massinger, Middleton, Ford, and Shirley. 3 units per semester. *Randall*

229, 230. English Literature of the Seventeenth Century. Major works in prose and poetry from 1600 to the death of Dryden. 3 units per semester. *Jackson (230), Lievsay, Randall, and Williams (229)*

232. Milton. Milton's poetry and prose, with emphasis on the major poems. 3 units. *Lievsay*

234. English Drama, 1642-1800. The heroic play and the comedy of manners of the Restoration; the important plays, serious and comic, of the eighteenth century. 3 units.

235, 236. The Eighteenth Century. Swift, Pope, Defoe, Addison, Steele, and others are studied in the first semester; in the second, Gray, Johnson, Boswell, Collins, Goldsmith, the novelists, and other writers. 3 units per semester. *Ferguson and Jackson*

241, 242. English Literature of the Early Nineteenth Century. The Romantic poets and prose writers. First semester, 1790-1810, with emphasis on Wordsworth, Coleridge, and Scott; second semester, 1810-1830, with emphasis on Byron, Shelley, and Keats. 3 units per semester. *Clubbe, Patton, Sanders, and Stevenson*

245, 246. English Literature of the Later Nineteenth Century. The first semester is devoted chiefly to Carlyle, Dickens, Thackeray, Tennyson, and Brown-ing; the second semester to Arnold, Ruskin, Pater, George Eliot, Meredith, the pre-Raphaelites, and Swinburne. 3 units per semester. *Clubbe, Patton, Sanders, and Stevenson*

251, 252. English Literature of the Twentieth Century. Representative work of leading writers from 1900 to 1950. in fiction, drama, and poetry. The first semester will include Shaw, Conrad, Yeats, Wells, Bennett, Galsworthy, Ford, Synge, Forster, and Lawrence; the second semester, Joyce, Woolf, Edith Sitwell, Eliot, Huxley, Graves, Bowen, Auden, and Dylan Thomas. Critical analysis of selected texts, with discussion of techniques and ideas. 3 units per semester. *Mellown and Smith*

263, 264. American Literature, 1800-1865. The writers emphasized in the first semester are Emerson, Thoreau, and Hawthorne; in the second semester, Poe and Melville. 3 units per semester. *Anderson, Budd, Jones, and Turner*

267, 268. American Literature, 1865-1910. Selected works of representative authors of the period. The first semester will include Whitman, Lanier, Mark Twain, James, Howells, Emily Dickinson, Henry Adams, and the Local Colorists; the second semester, Crane, Norris, Moody, London, Dreiser, Edith Wharton, Willa Cather, O'Neill, Robinson, and Frost. The lectures will deal primarily with literary trends as shaped by the social background. 3 units per semester. *Budd*

270, 271. Southern Literature. The principal authors and the chief literary development from the beginning to the present. Emphasis in the first semester is on Byrd, Kennedy, Simms, Poe, Timrod, and the humorists; in the second, on Lanier, Harris, Cable, Mark Twain, Ellen Glasgow, and Faulkner. Attention is given to the historical and cultural background and to literary relations extending outside the region. 3 units per semester. *Turner*

275, 276. American Literature Since 1910. First semester, selected fiction from Gertrude Stein to the present. Second semester, poetry from the Imagist movement to the present. 3 units per semester. *Duffey and Strandberg*

277. Major Developments in Contemporary American Poetry. The principal contributions to modern poetry made by American poets, including imagism and the new poetry; Eliot, Stevens, Crane, the "Fugitives," and a selection from the poets of the present generation. 3 units.

280. Introduction to Folklore. A survey of the materials of popular tradition, the folksong, the folktale, the proverb, the riddle, and other forms; the methods of folklore investigation; and the relation of these popular genres to literary tradition. 3 units. *Nygard*

285. Literary Criticism. A study of the Greek and Roman critics, in chronological order but with emphasis on their permanent value rather than on the mere history; also of the Continental and English critics to about 1700. 3 units. *Lievsay*

287. Recent Critical Thought. A survey of ideas relevant to the development of modern literature and its cultural relations. 3 units. *Duffey*

289. Literary Biography. Reading and discussion of works by Plutarch, Roper, Walton, Aubrey, Mason, Johnson, Boswell, Lockhart, Carlyle, Froude, Gosse, and Strachey: the development of the literary form, its various methods, and various theories of its nature and purpose. 3 units. *Sanders*

298-299. A.M. Independent Reading. For A.M. English candidates choosing the non-thesis program. Students will register for 3 units each semester in their first year of graduate study. No grade will be awarded.

For Graduates

310. Beowulf. Reading and interpretation of the text. 3 units. *Nygard*

312. Studies in Middle English Literature. The literature of England from 1100 to 1500 (excluding Chaucer); a study of medieval genres with a close reading of selected major works. 3 units. *Nygard and Reiss*

315. Studies in Chaucer. Cultural background, sources, themes, structures; special attention to *Troilus* and the dream-vision poems. 3 units. *Nygard and Reiss*

318. Medieval Romances. Origins, types, forms, themes; special attention to Arthurian materials. 3 units.

320. Studies in Renaissance English Prose. Close readings in various forms and authors as they reflect the culture and thought of the Renaissance. 3 units. *Lievsay*

324. Studies in Shakespeare. Intensive study of carefully limited topics, together with critical analysis and interpretation of selected texts. 3 units. *Williams*

329. Studies in the Metaphysical Poets. A careful study of Donne, Herbert, and Vaughan against the seventeenth-century background, with some attention to their influence on other writers in the period and their impact on twentieth-century poetry. 3 units. *Lievsay*

330. Studies in Dryden and His Age. The early poems, the important odes, the religious and political poems, selected critical and controversial prose, and the heroic play and tragedy. 3 units.

331. Emerson. A study of Emerson's ideas as reflected in selected examples of his essays and poems. 3 units.

337. Studies in Swift. Intensive study of the major prose; selected readings in the verse, political writings, and miscellaneous prose. 3 units. *Ferguson*

338. Samuel Johnson's Literary Criticism and Related Topics. 3 units. *Ferguson*

339. The Eighteenth-Century Novel. Richardson, Fielding, Smollett, and Sterne are emphasized. Attention is given to earlier prose fiction and to other contributing literary patterns. 3 units. *Ferguson*

341. Studies in English Romanticism. 3 units.

343. Studies in the Critical and Philosophical Ideas of Coleridge and Carlyle. 3 units. *Sanders*

347. Studies in Victorian Poetry. Analysis of themes, forms, and sources in the works of Tennyson, Browning, Arnold, Rossetti, Swinburne, Meredith, Hardy, and Hopkins. 3 units. *Stevenson*

348. Studies in Victorian Fiction. Techniques and principal types of material in the novels of Dickens, Thackeray, Trollope, Eliot, Meredith, and Hardy. 3 units. *Stevenson*

349. Studies in Nineteenth-Century Nonfictional Prose. 3 units. *Sanders*

353. Studies in British Poetry of the Twentieth Century. Detailed examination of major poetic texts, with background readings in prose. 3 units. *Smith*

360. Bibliography and Methods of Research in American Literature. Bibliographical aids in criticism, historiography, and the comparative aspects of the literature and ideology of the United States will be discussed, and exercises will be conducted in such procedures as editing manuscripts, collating literary texts, writing scholarly book reviews, and the mechanics of master's essays and doctoral dissertations. 3 units.

364. Hawthorne and Melville. Extensive reading in the works of Hawthorne and Melville, and close study of selected writings. 3 units. *Jones and Turner*

365. Emerson. A study of Emerson's ideas as reflected in selected examples of his essays and poems. 3 units.

366. Whitman. A detailed study of *Leaves of Grass* and of selected prose works. 3 units.

368. Studies in American Realistic Fiction. Intensive study of a post-Civil War novelist such as Howells, with lesser attention to a representative precursor such as De Forest, and a twentieth-century writer such as Dreiser. 3 units. *Budd*

369. Studies in American Humor. The native tradition in the Down-East humorists and the humorists of the Old Southwest, in Mark Twain and his contemporaries, and afterward. 3 units. *Turner*

376. Studies in Twentieth-Century American Literature. Selected problems posed by the poetry, prose, fiction, or drama of this century. 3 units. *Duffey*

380. The Traditional Ballad and Folksong. Studies in English, Scottish, and American popular poetry, with attention to the textual and musical traditions. (No technical knowledge of music is required.) 3 units. *Nygard*

382. Paleography. Textual criticism of medieval and Renaissance handwritten documents. 3 units.

383. Textual Criticism. The principles of analytical bibliography and their application to problems and procedures in the study of Elizabethan printed books. 3 units. *Williams*

100. English for Foreign Students. A non-credit semester course in English for foreign students. Restricted to registered undergraduate and graduate foreign students and, to capacity, to employees and wives of foreign students.

Forestry

Professor Ralston, *Dean* (213 Biological Sciences Building); Professor Anderson, *Director of Graduate Studies* (04 Biological Sciences Building); Professors Barnes, Harrar, Hellmers, and Kramer; Associate Professors Knoerr, Stambaugh, and Yandle; Adjunct Associate Professors Clark, Hodges, Metz, and Vukovich; Assistant Professors Chapman, Convery, and Wuenschel

Major and minor work is offered in the natural and social scientific aspects of forestry and related areas of natural resources leading to the Master of Arts, Master of Science, and Doctor of Philosophy degrees. Work for these degrees may be pursued in the biological science areas of dendrology and wood anatomy, forest ecology, tree physiology and biochemistry, forest entomology and forest pathology; in the environmental science areas of forest soils, meteorology, and hydrology; in resource economics and policy; and in forest mensuration, biometry, and operations research. College graduates who have had specialized training in professional forestry or the related basic areas of the natural or social sciences will be considered for admission. Students will be restricted to the particular fields of specialization for which their academic background qualifies them. For information on professional training in forestry, the *Bulletin of the School of Forestry* should be consulted.

The specific degrees available in forestry and related natural resources through the Graduate School are: the Master of Arts (with or without a thesis), Master of Science (with a thesis), and the Doctor of Philosophy degrees. Students majoring in forestry must demonstrate satisfactory knowledge of one foreign language as part of the requirements for both the Master of Arts and Doctor of Philosophy degrees. More information on degree and language requirements can be found in the program information section of this *Bulletin*.

BIOLOGICAL SCIENCE

Dendrology and Wood Anatomy

241. Dendrology. Nomenclature, classification, identification, and silvicultural characteristics of woody plants. Special attention is given to the tree species indigenous to southeastern United States and other important forest regions of temperate North America. Prerequisites: Biology 1-2 or equivalent. 3 units. *Harrar and White*

290. Wood Anatomy. Study of the physical features and the gross and minute structural characteristics of wood leading to the identification of the commercial woods of the United States, and the important tropical woods used in American wood-working industries. Elementary microtechnique. Prerequisites: one year of biology, Forestry 241, or equivalent. 3 units. *Harrar*

292. Microtechnique of Woody Tissue. Preparation of wood for microscopic study including sectioning, staining, and mounting techniques; elementary photomicrography. Prerequisites: Forestry 241 and 290 or equivalent. 3 units. *Harrar*

398. Timbers of the World. A study of the properties of various groups of tropical and temperate zone woods with particular emphasis upon those used in marine construction, and for lumber, plywood decorative paneling, and furniture. Prerequisite: Forestry 290 or equivalent. 2 units. *Harrar*

Ecology

243. Natural Resource Ecology. An introduction to modern ecology as applied to natural resource management and environmental protection. Emphasis put on the ecosystem as the basic unit of management. Prerequisite: permission of instructor. 3 units. *Wuenschel*

341. Ecological Principles in Environmental Management. Discussion of the application of ecological principles to environmental manipulation. Methods of planning and managing human use of ecosystems while avoiding environmental deterioration. Stress put on the biological viewpoint. Prerequisites: general ecology and Forestry 243 or other substantive coursework in ecology. 3 units. *Wuenschel*

345, 346. Natural Resource Ecology—Environmental Management Seminar. Discussion of current ecological and environmental problems and research topics related to the management of natural resources. 1 unit per semester. *Staff*

354. Quantitative Analysis of Ecological and Environmental Systems. Study of quantitative methods for describing forest ecosystems. Analysis of characteristics and dynamic behavior of biological populations; development and evaluation of mathematical models for ecological, physiological, and environmental systems. Simulation techniques for ecosystem analysis will be considered. Prerequisites: Forestry 204, 243, 253, and 353. 3 units. *Chapman, Yandle, and Staff*

Physiology and Biochemistry

201. Tree Physiology. A general survey of the major physiological pro-

cesses in trees and other plants, including food synthesis, growth and water relations. Special project and term paper required. Lectures, laboratories, and readings. Prerequisite: permission of instructor. 3 units. *Hellmers*

205. Tree Growth and Development. Life processes, growth, and development of trees, with emphasis on physiological processes and environmental influences on structure, composition, and function. 3 units. *Barnes*

207. Chemistry of Woody Tissues. Composition of wood at the elemental, molecular, and macromolecular levels; both in woody plants and in processed woods. Distribution and properties of main components, and methods of analysis. Prerequisite: organic chemistry or consent of instructor. 3 units. *Barnes*

208. Physiology of Wood Formation. Processes involved in the growth and development of woody tissues, including internal control mechanisms and effects of environmental stresses on structure and composition. Prerequisite: Forestry 201 and 241 or equivalents. 3 units. *Barnes*

305. Forest Tree Biochemistry. Study of the biological synthesis, function, and degradation of the main biochemical constituents of trees. Emphasis on cellulose and other cell-wall polysaccharides, lignins, terpenes, and phenolics and other extractives. Prerequisites: Forestry 201 and a course in biochemistry. 3 units. *Barnes*

Pathology

222. Biology of Forest Insects and Diseases. Fundamentals of entomology and plant pathology as applied to forest protection; coordinated laboratory work with emphasis on identification and interpretation of forest and wood degradation. 4 units. *Anderson and Stambaugh*

223. Forest Pathology. Infectious and non-infectious diseases of forest trees, and related deterioration of forest products. Field and laboratory study of symptoms, etiology, and control. Prerequisites: Biology 11 and 12 or equivalent. 3 units. *Stambaugh*

321. Phytopathological Technique in Forestry. Fundamentals of phytopathology and their application to field and laboratory investigations of tree diseases and wood degradation; biological interpretation of host-pathogen-environment interaction is stressed in literature review, experimentation, and scientific writing. Prerequisite: Forestry 223 or equivalent. 4 units. *Stambaugh*

322. Microbiology of Forest Soils. Qualitative and quantitative characterization of the microbial populations of forest soils with emphasis on rhizosphere interactions in root pathogenesis and mycorrhizal development; epidemiology of root diseases of trees; principles of control. Prerequisites: Forestry 223; mycology or bacteriology is recommended. 3 units. *Stambaugh*

385. Seminar in Forest Protection. Discussion of current problems in entomology and pathology and evaluation of topical research for protection and control application in forest resource management. Prerequisites: Forestry 223 and 230. 1 unit. *Anderson and Stambaugh*

Entomology

222. Biology of Forest Insects and Diseases. (See description under Pathology above.)

230. Forest Entomology. Identification, biology, and control of insects that cause damage to trees and wood products. Emphasis of diagnosis is on the characteristics of the damage and the stages of the insects responsible. Prerequisite: Forestry 222 or equivalent or consent of instructor. 3 units. *Anderson*

233. General Entomology. Principles of morphology, physiology, metamorphosis, and taxonomy of insects. Prerequisite: one course in entomology or zoology or consent of the instructor. 4 units. *Anderson*

331. Toxicology of Insecticides. Study of the physical, chemical, and biological properties of materials used to destroy insects. Formulation, toxicology, and insect physiology as related to insecticide action are emphasized. Prerequisite: one course in entomology; organic chemistry is recommended. 3 units. *Anderson*

332. Ecology of Forest Insects. The influence of environmental factors on the vital processes of insects with emphasis on how both the abiotic and biotic elements influence the fluctuation of forest insect populations. Prerequisite: one course in entomology or zoology or consent of the instructor. 3 units, 4 units with laboratory. *Anderson*

335. Entomological Research Techniques. Problem analyses, scientific writing, and laboratory and field research methods which are especially applicable to entomological problems. 1 unit. *Anderson*

385. Seminar in Forest Protection. (See description under Pathology above.)

ENVIRONMENTAL SCIENCE

Soils

261. Forest Soils. Origin, development, and classification of soils with special emphasis on those developed in humid climates; morphological, physical, and chemical properties of soils in relation to growth of trees; effect of forests on soils. Prerequisites: Chemistry 1 and 2, and Physics 1, or equivalents; physical geology, mineralogy, petrology, and analytical chemistry are also desirable. 3 units. *Ralston*

362. Forest Soil Physics. Analysis of the physical properties of soil related to the growth and development of forest trees. Consideration is given to the significance of soil moisture, temperature, aeration, and structural characteristics in the analysis of forest growth relationships. Prerequisite: Forest 261. 3 units *Ralston*

364. Soil Classification and Mapping. Classification of soils as natural bodies. Mapping of soils, land use classes, and forest site classes; field study will be made of soils in either the coastal plain or mountains. Prerequisite: Forestry 261. 3 units. *Ralston*

366. Forest Soil Fertility. The relationships of soil fertility factors in the growth of forest trees. Emphasis is placed on the analysis of soil factors related

to the mineral nutrition of trees. Prerequisite: Forestry 262; analytical chemistry is recommended. 3 units. *Ralston*

Meteorology

203. General Meteorology. A general introduction to the science of meteorology, particularly for students concerned with problems in biology and hydrology. Emphasis is placed on the fundamentals and role of atmospheric thermodynamics and energy and mass transfer processes in determining both local and regional aspects of weather and climate. 3 units. *Vukovich*

204. Microclimatology. Introduction to the micrometeorological processes. Discussion of the integration of these processes and the resulting microclimates in the rural (forest, field, and water surface) and urban environments. Methods for modification of the microclimate. 3 units. *Knoerr*

215. Air Pollution Meteorology. The theory of transport and diffusion of air pollutants and its application to practical problems and computations involving both single sources and multiple sources, including urban communities; modeling of transport and diffusion, both in wind tunnels and computers; stack design from the meteorological point of view; the organization of meteorological networks and field studies; the measurement, monitoring and equipment requirements of pertinent meteorological parameters; air pollution climatology; meteorological management of air pollution. Prerequisite: introductory course in general meteorology (Forestry 203 or equivalent). (Course sponsored by Triangle Universities Consortium on Air Pollution and taught by faculty from North Carolina State University). 3 units. *Staff*

217. Environmental Instrumentation. Consideration of the physical basis for measuring parameters of natural and controlled environments. Properties and effective utilization of contemporary electronic measurement and data acquisition systems, including transducers, signal conditioners, and analog and digital recorders. Methods for obtaining and processing computer compatible records. Precision measurement and calibration techniques with primary and secondary laboratory standards. Two lectures and three laboratory hours per week. Prerequisites: consent of the instructor; students should have a basic knowledge of the properties of environmental parameters and be able to write computer programs. 3 units. *Knoerr*

304. Atmospheric Turbulence and Diffusion. Bulk and molecular aspects of atmospheric turbulence. Navier-Stokes equations and the Reynold's stresses. Mixing-length and statistical turbulence theories. Similarity hypotheses. Turbulent transfer and diffusion in adiabatic and diabatic atmospheres. Characteristics of turbulence in various scales of motion from the planetary to sub-inertial range. Prerequisites: Forestry 203 and differential equations or consent of instructor. (Offered on sufficient demand.) 3 units. *Vukovich*

306. Dynamics of Local Atmospheric Motion. Characteristics of atmospheric motion in the 100 m to 100 km scale. Analytic development from hydrodynamic and thermodynamic equations, incorporating appropriate scale forcing functions of heating and terrain roughness. Theory and characteristics of land and sea breezes, mountain and valley breezes, mountain waves and local modification of large scale

atmospheric motion. Prerequisites: Forestry 203 and differential equations or consent of instructor. (Offered on sufficient demand.) 3 units. *Vukovich*

344. Micrometeorology. Physics of the earth's surface environment with emphasis on plant and animal microclimates: budgets of mass, momentum and energy; vertical structure of wind, temperature, water vapor and carbon-dioxide in relation to exchange processes within the biosphere; local circulation and eddy diffusion; principles of micrometeorological measurement. Prerequisites: Forestry 203 or equivalent, and calculus. (Offered on sufficient demand.) 4 units. *Knoerr*

Hydrology

216. Watershed Hydrology. Influence of vegetation, soil types, and land forms on water yield, water quality, and flood potential. Analysis of precipitation patterns, infiltration rates, erosion forces, and sediment carrying capacities of streams. Techniques and research methods used to control the hydrologic cycle, water quality and water yield on wild lands. 3 units. *Hellmers*

342. Hydrologic Processes. Physical processes of the hydrologic cycle with emphasis on those processes which can be modified or controlled by watershed management. (Offered on sufficient demand.) 3 units. *Knoerr*

RESOURCE ECONOMICS AND POLICY

269. Resource Economics and Policy. Development and critical review of concepts useful in understanding and evaluating the distribution of natural resource use over time in terms of the relations between technological knowledge, group and individual behavior, and social institutions. 3 units. *Convery*

270. Economics of Forestry. Development of the principles of economics useful in the analysis of the past, present, and prospective supply and demand situations for forestry goods and services; problems of the economics of the firm and industry, basic and peculiar to forestry, with special attention to the time dimensions of value; the role of forestry in the general economy including attention to relevant institutional factors. Prerequisite: Forestry 269 or one course in the principles of economics. 3 units. *Convery*

377. Seminar in Natural Resource Allocation and Efficiency. Evaluation of economic principles concerned with problems of natural resource allocation, with special attention to the alternatives for governmental policies in private property economics. Prerequisite: an advanced level course in non-market decision-making or Forestry 378 or its equivalent. 2 units. *Convery*

378. Seminar in Forest Economics. Examination and discussion of the application of economic concepts in forestry, the potential contribution of economic analysis to private and public forest management; current research in forest economics. Prerequisite: Forestry 270 and 379 or consent of the instructor; advanced courses in economics and economic theory are desirable. 2 units. *Convery*

STATISTICS AND OPERATIONS RESEARCH

210. Analytical Techniques in Forest Utilization. Introduction to utiliza-

tion in the managed forest and principal wood-using industries and to operations analysis methods applied to scheduling and production problems in these industries. 3 units. *Yandle*

250. Biometry. Concepts and methods of statistics essential to the collection, analysis, and interpretation of resource and biological data. Emphasis is placed on problems of estimation, inference, and decision-making with experimental data. 3 units. *Yandle*

251. Theory and Methods for Sampling Biological Populations. Introductions to statistical methods for sampling natural resources and biological populations. Simultaneous consideration is given to theoretical and experimental problems in the design and applications of sampling methods and in the interpretation of sample data. Prerequisite: Forestry 250 or consent of instructor. 3 units. *Yandle*

253. Computer Science in Natural Resources. Components and organization of a computer system; automatic programming languages; storage and retrieval systems (TSAR); equation fitting by iteration and least squares methods; graphical techniques. 1 unit. *Chapman*

258. Operations Research. Mathematical model formulation and development of techniques to aid decision-making in problems of natural resource allocation and use. Includes the theory and techniques of inventory control, equipment replacement planning, queuing theory, competitive strategies, allocation, sequencing and dynamic programming. Consideration is given to both deterministic and non-deterministic models. 3 units. *Staff*

352. Theory and Applications of Linear Statistical Models. Theoretical development of the general linear statistical model together with extensions to accommodate linear approximation of non-linear cases. Curve fitting techniques are developed with emphasis on applications to natural phenomena. Prerequisite: consent of the instructor. 3 units. *Chapman*

353. Design and Analysis of Experiments. Extension of the theory of estimation and testing for general linear models to include the less than full rank case. Experimental design models such as factorial and incomplete block models are developed as special cases of the general theory. Emphasis is placed on field and laboratory designs together with appropriate computerized analysis techniques. Prerequisite: Forestry 352. 3 units. *Chapman*

354. Quantitative Analysis of Ecological and Environmental Systems. (See description under Ecology above.)

SPECIAL STUDIES AND RESEARCH

299. Special Studies in Forestry. Work on the senior-graduate level to meet the needs of individual students offered in the areas of forestry and related natural resources designated under Forestry 357, 358. Credits and hours to be arranged. *Staff*

301, 302. Advanced Studies in Forestry. Work on the advanced graduate level to meet the needs of individual students offered in the areas of forestry

and related natural resources designated under Forestry 357, 358. Credits and hours to be arranged. *Staff*

357, 358. Research in Forestry. Students with adequate training may undertake special research problems under direction of members of the faculty in the following branches of forestry and related natural resources. Credits to be arranged.

1. *Forest Ecology*. Prerequisite: Forestry 243 or equivalent. *Wuenschel*
2. *Forest Soils*. Prerequisite: Forestry 261 or equivalent. *Ralston*
3. *Silviculture*. Prerequisites: Forestry 243 and 244 or equivalents. *White*
4. *Forest Management*. Prerequisite: Forestry 281 or equivalent. *Staff*
5. *Forest Economics*. Prerequisite: Forestry 270 or equivalent. *Staff*
6. *Wood Anatomy and Properties*. Prerequisites: Forestry 241 and 290 or equivalents. *Harrar*
7. *Forest Mensuration and Biometry*. Prerequisites: Forestry 250 and 352 or equivalents. *Chapman*
8. *Forest Entomology*. Prerequisite: Forestry 230 or equivalent. *Ander-son*
9. *Forest Operations Research*. Prerequisite: consent of instructor. *Yan-dle*
10. *Dendrology*. Prerequisite: Forestry 241 or equivalent. *Harrar and White*
11. *Forest-Tree Physiology*. Prerequisites: plant physiology and plant or forest ecology. *Barnes, Hellmers, and Kramer*
12. *Forest Pathology*. Prerequisites: plant physiology and Forestry 223 or equivalents. *Stambaugh*
13. *Forest Meteorology and Hydrology*. Prerequisites: Forestry 203, 342, or equivalents. *Knoerr*
14. *Forest Biochemistry*. Prerequisites: plant physiology and organic chemistry. *Barnes*

368. Field Seminars. Field studies, consultations, and visits to areas of interest during spring vacation period or at other times, in the several branches of forestry and related natural resources listed under Forestry 357, 358. Credits to be arranged. *Staff*

RELATED COURSES IN OTHER DEPARTMENTS

Many courses available in other departments of the university are related to the biological, environmental, economics and policy, and biometrics and operations research areas of forestry and other natural resources. These courses offered in botany, zoology, biochemistry, chemistry, physics, engineering, mathematics, economics, business administration, sociology, and political science may be utilized by graduate students in the School of Forestry. For a specific listing of pertinent courses available in other departments see the *Bulletin of the School of Forestry*.

The University Program in Genetics

Professor Gross, *Director* (Biochemistry); Professors Amos (Microbiology and Im-

munology), Buettner-Janusch (Anatomy and Zoology), and Guild (Biochemistry); Associate Professors Gillham (Zoology), C. Ward (Zoology), and Webster (Biochemistry); Assistant Professors Antonovics (Botany), Boynton (Botany), Hall (Biochemistry), Harriman (Biochemistry), Kelley (Biochemistry and Medicine), Kredich (Biochemistry and Medicine), Luftig (Microbiology and Immunology), and F. Ward (Microbiology and Immunology)

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Graduate students registered in any of the biological sciences departments may apply to the faculty of the genetics program to pursue study and research leading to an advanced degree. It would be helpful if applicants for admission to the Graduate School indicated their interest in the genetics program at the time of application. Requests for information describing more completely the research interests of the staff, facilities, and special stipends and fellowships should be addressed to the Director, Genetics Program (Nanaline H. Duke Building, Room 151).

For Seniors and Graduates

204. Introductory Genetics. An introduction to genetic analysis with emphasis on the molecular basis of mutation, segregation, function, and organization of the genetic material. Primarily for medical students but graduate students may be admitted with the instructor's permission. (Listed as Biochemistry 204.) 2 units. *Gross and Staff*

215. Bacteriophage: Structure and Function. Classical experiments of Luria, Hershey, and Delbrück. Timing of events during infection. Morphogenesis of component substructures. Interactions of bacteriophage with host cell walls and membranes. These areas will be covered in the context of coliphages. (Also listed as Microbiology and Immunology 215.) 2 units. *Luftig and Nichols*

216. Molecular Genetics. An advanced course on genetic mechanisms and their relationship to nucleic acids. Prerequisites: introductory courses in biochemistry and genetics. (Also listed as Biochemistry 216.) 3 units. *Guild and Staff*

236. Human Genetics. Particular emphasis upon the uniqueness of studies in human biochemical and population genetics. Prerequisite: Anatomy 231 (Anthropology 231, Zoology 131), or an elementary course in biology including genetics, or permission of instructor. (Also listed as Anatomy 236, Anthropology 236, and Zoology 236.) 3 units. *Buettner-Janusch*

280. Principles of Genetics. An introduction to the structure and properties of genes and chromosomes and to the evolution of genetic systems. Prerequisites: introductory courses in biology, chemistry, and mathematics. (Listed as Botany 280 and Zoology 280.) 3 units. *Antonovics, Boynton, and Gillham*

282. Experimental Genetics. A series of laboratory exercises and discussions on the molecular mechanisms of mutation, recombination, replication, transcription, and translation of the genetic material. Prerequisite: consent of instructor. (Listed as Biochemistry 282.) 2 units. *Harriman and Staff*

283. Developmental and Cellular Genetics. A seminar and lecture course

devoted to the analysis of the current literature in developmental and cellular genetics. Prerequisites: Genetics 280 or its equivalent, and consent of instructor. (Listed as Botany 283 and Zoology 283.) 2 units. *Boynton and Gillham*

284. Current Topics in Genetic Mechanisms. A seminar and lecture course devoted to the analysis of current publications on molecular genetics. Given in response to adequate demand. Prerequisites: Genetics 280 or its equivalent and consent of the instructor. (Also listed as Biochemistry 284.) 1 unit. *Hall and Staff*

285. Population Genetics and Evolution. A seminar and lecture course devoted to the analysis of the current literature in population genetics and evolution. Prerequisites: Genetics 280 or its equivalent and consent of the instructor. (Listed as Botany 285.) 3 units. *Antonovics and Staff*

288. The Cell in Development and Heredity. A seminar on topics of current interest and controversy. Prerequisite: a course in genetics and permission of one instructor. (Alternates with Anatomy 244 and Zoology 244.) (Listed also as Anatomy 288 and Zoology 288.) *Counce, Gillham, and Staff*

For Graduates

336. Immunogenetics. Production of inbred and coisogenic strains. Mutation and recombination in inbred animals and tumors. Genetic control of histocompatibility isoantigens in tumors and normal tissues, differential gene action in hybrids and tumors. Antigenic and immunologic factors in homocraft rejection, tests for genetic compatibility. Modification of the immune response by genetic or immunologic procedures—tolerance, enhancement, suppression of antigens. (Listed as Microbiology and Immunology 336.) 2 units. *Amos*

351-352. Genetics Seminar. Required of all students specializing in genetics. (Listed as Biochemistry 351-352.) 1 unit per semester. *Gross and Staff*

Geology

Professor Heron, *Chairman* (119 Science Building); Associate Professor Pilkey, *Director of Graduate Studies* (05 Science Building); Associate Professors Furbish, Lynts, and Perkins; Visiting Assistant Professor Mantuani; Adjunct Assistant Professor McIntyre

The Department of Geology offers graduate work leading to the A.M. degree. An undergraduate degree in geology is not a prerequisite for graduate studies, but a student must have had or must take a summer field geology course (or equivalent experience), mineralogy, sedimentary rocks, stratigraphy, paleontology, and structural geology. In addition he must have had one year of college chemistry, one year of college physics, and mathematics through calculus.

Graduate courses in the Department of Geology are designed to provide specialized training in the fields of oceanography, sedimentology, stratigraphy, paleontology, and low-temperature mineralogy.

An acceptable thesis is required. There is no language requirement for the A.M. degree.

For Seniors and Graduates

205. Geological Oceanography. The study of the broad geologic aspects of the ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary process. Observations in the field will be emphasized and will include training in sampling procedures for both shallow and deep water. This course is not open to students who have completed Geology 206. (Given at Beaufort only.) 6 units. *Pilkey*

206. Principles of Geological Oceanography. A broad survey of many geological aspects of the oceans including sediment types, processes of sedimentation, geological structures of the ocean basins, and bottom physiography. Prerequisites: Geology 213 or consent of instructor. 3 units. *Pilkey*

208. Shallow-Marine Geology. Physical and biological processes responsible for sediment production, accumulation, and alteration in the shallow-marine environment. Prerequisite: Geology 108 or consent of instructor. 3 units. *Perkins*

211. Stratigraphic Principles and Applications. Survey of stratigraphic principles with an emphasis on their application to the solution of stratigraphic problems. Discussions of case histories from the literature. Prerequisites: Geology 108. 3 units. *Perkins*

***212. Environmental Stratigraphy.** Application of modern sedimentological models to the environmental interpretation of ancient sedimentary sequences. Prerequisite: Geology 211. 3 units. *Perkins*

213. Sedimentology. The parameters of sedimentation, sediment classification, and laboratory methods of analysis. Prerequisites: Geology 108 or consent of instructor. 3 units. *Pilkey*

214. Sediments in Thin Section. The study of sediments and sedimentary rocks using the petrographic microscope and related techniques. Interpretation of rock textures and their genesis will be emphasized. Prerequisites: Geology 213 or consent of the instructor. 3 units. *Perkins*

222. Sedimentary Minerals. Structure and geologic occurrences of selective detrital and authigenic minerals including the clay minerals. Theory and use of X-ray diffraction, differential thermal analysis, and thermal gravimetric analysis. Prerequisites: Geology 102 or consent of instructor. 3 units. *Heron*

226. Sedimentary Geochemistry. Analysis of the chemical principles controlling geochemical processes and their application to recent and ancient sediments. 3 units. *Mantuani*

***229. Economic Geology.** An analysis of the principles and processes involved when elements are concentrated to economic proportions in magmatic, metamorphic, hydrothermal, sedimentary, or surface environments. Prerequisites: Geology 102. 3 units. *Furbish*

230. Principles of Structural Geology. Description, origin, and interpretation of primary and secondary geologic rock structures. Prerequisites: Geology 106 and 108. Given biennially. 3 units. *Furbish*

*Offered on demand.

241-242. Invertebrate Paleontology. Biologic and stratigraphic relationships of fossil invertebrates, with special emphasis on evolutionary trends of invertebrates as interpreted from fossil evidence. Prerequisites: Geology 2 or consent of instructor. Given biennially. 3 units per semester. *Lynts*

243-244. Micropaleontology. Microscopic animal and plant fossils, exclusive of spores and pollen, with special emphasis on their biology, taxonomy, evolution and stratigraphic distribution. Prerequisite: Geology 242 or consent of instructor. Given biennially. 3 units per semester. *Lynts*

247. Paleocology. Application of ecologic and geologic principles to the reconstruction of the interrelationship between organisms and their environment in geologic time. Prerequisites: Geology 213, 242 or consent of instructor. Given biennially. 3 units. *Lynts*

For Graduates

***300. Seminar in Oceanography.** 1 to 3 units. *Staff*

305. Seminar in Continental Drift and Global Tectonics. Given biennially. 3 units. *Lynts*

***310. Seminar in Stratigraphy.** 1 to 3 units. *Staff*

***312. Seminar in Sedimentology.** 1 to 3 units. *Staff*

***320. Seminar in Mineralogy.** 1 to 3 units. *Staff*

***330. Seminar in Geochemistry.** 1 to 3 units. *Staff*

***340. Seminar in Paleontology.** 1 to 3 units. *Staff*

***350. Seminar in Geomathematics.** 1 to 3 units. *Staff*

***371, 372. Advanced Topics in Geology.** To meet the individual needs of graduate students for independent study in various environmental sedimentary fields. 1 to 3 units. *Staff*

Germanic Languages and Literature

Professor Phelps, *Chairman and Director of Graduate Studies* (102 Foreign Languages); Professor Salinger; Assistant Professors Alt, Novak, and Stern

The Department of Germanic Languages and Literature offers graduate work leading to the A.M. degree. Students who expect to major in German should have had sufficient undergraduate courses in Germanic languages to enable them to proceed to more advanced work.

Students who wish to take courses in German for a minor should normally have completed a third-year course (in exceptional cases, a second-year) of college German with acceptable grades.

*Offered on demand.

For Seniors and Graduates

***201, 202. Goethe.** A study of his life and works in the light of his lasting significance to Germany and world literature. First semester: lyrics, prose fiction, and selected dramas; second semester: *Faust, I and II*. 3 units per semester. *Novak, Phelps, and Salinger*

203, 204. Eighteenth Century. Eighteenth-century German literature in its relation to European intellectual currents of that time. 3 units per semester. *Phelps*

***205, 206. Middle High German.** The language and literature of Germany's first classical period. 3 units per semester. *Stern*

***207, 208. German Romanticism.** The principal writers of the period of German Romanticism from 1800 to 1850. 3 units per semester.

209, 210. Kleist, Grillparzer, and Hebbel. The development of the drama in Germany and Austria between Schiller and Naturalism. 3 units per semester. *Alt and Salinger*

211, 212. Nineteenth-Century Literature. From the end of Romanticism through Realism. 3 units per semester. *Alt*

213. Heinrich Heine. A study of the German poet and his impact upon his age. 3 units. *Salinger*

214. The Twentieth Century. Literature from the turn of the century to the present through representative authors. 3 units.

***215. Seventeenth-Century Literature.** A study of the leading writers of the Baroque, viewed against the background of their time. 3 units.

216. History of the German Language. The development of the phonology, morphology, and syntax of German from earliest beginnings to the present. 3 units. *Stern*

***217. Renaissance and Reformation Literature.** The period from 1400 to about 1600. 3 units.

***218. The Teaching of German.** A survey of modern teaching techniques: problems in the teaching of German on the secondary and college levels. Analysis and evaluation of textbooks and related audiovisual materials. 3 units. *Phelps*

***219. Applied Linguistics.** The application of modern linguistic principles to a systematic study of the phonetics, morphology, and syntax of modern German. Prerequisite: permission of the instructor. 3 units. *Stern*

***230. German Cultural History.** A study of the backgrounds of German civilization and culture (*Kulturkunde*) from earliest times down to the most recent. 3 units.

***232. Bibliography and Methods.** An introduction to the tools and methods of research in Germanic philology and German literature. 3 units.

*Offered on demand.

***233. Advanced Composition.** Intensive study of syntax; practice in the writing of German prose, aiming toward the development of an expressive and fluent style. 3 units.

For Graduates

***301. Gothic.** 3 units. *Stern*

***316. The Austrian Novel from 1930 to the Present.** Studies in the novels of Hermann Broch, Robert Musil, and Heimito von Doderer. 3 units. *Salinger*

321, 322. Germanic Seminar. 3 units per semester. *Alt, Phelps, Salinger, and Stern*

———. **Graduate Reading Course.** An intensive course in German to develop rapidly the ability to read German in several fields. Graduate students only. No credit.

Related Courses in Other Departments

The following courses in other departments are recommended to students who are majoring in Germanics, as particularly valuable in building a proper background for Germanic studies.

a. Graduate courses in foreign or comparative literature or philology, offered by the ancient and modern language departments, to be selected after consultation with the Germanic Languages Department.

b. Graduate courses in history and philosophy, offered by those departments, to be selected after consultation with the Germanic Languages Department.

History

Professor Colton, *Chairman* (235 Allen); Professor Young, *Director of Graduate Studies* (237 Allen); Professors Alden, Durden, Embree, Ferguson, Hamilton, Holley, Hollyday, Lanning, Oates, Parker, Preston, Ropp, A. Scott, W. Scott, Silberman, TePaske, and Watson; Associate Professors Acomb, Brieger, Cell, Davis, Lerner, and Witt; Assistant Professors Gavins, Hartwig, Mauskopf, Miller, and Nathans

The Department of History offers graduate work leading to the A.M. and Ph.D. degrees. The candidate for the A.M. degree must have a reading knowledge of at least one ancient or modern language related to his program of study and have completed successfully either a research paper (approximately fifty to sixty documented pages) or two related, chapter-length papers (approximately twenty-five to thirty documented pages each), normally the product of a year's seminar or two semester-courses. The paper or papers must be approved by two readers—the supervising professor and a second professor from the graduate staff. Students anticipating a May degree must have their papers read and approved by April 15; those anticipating a September degree must have their papers read and approved by August 15.

*Offered on demand.

A candidate for the degree of Doctor of Philosophy is required to prepare himself for examination in four fields. Three shall normally be history. The choice of fields is determined in consultation with the student's supervisor and the Director of Graduate Studies. The department offers graduate instruction in the fields of Afro-American history, ancient history, medieval Europe, early modern Europe, recent Europe, American history, English Renaissance, Modern Britain, British Empire and the Commonwealth, pre-revolutionary Russia, revolutionary Russia, Latin America, South Asia in the modern period, traditional China, modern China, traditional Japan, modern Japan, military history, history of science, history of medicine, and historiography. The candidate for the Ph.D. degree must normally have a reading knowledge of two foreign languages, but in certain cases where the candidate's supervisor and the Director of Graduate Studies approve, and where the candidate's research for the dissertation would appreciably benefit, an alternative to the second language may be accepted. This alternative would normally take the form of successfully completed formal training in an auxiliary discipline (such as statistics or social science methodology) of from 3 to 6 units, or their equivalent, depending on the student's program. It also must be in addition to any previous undergraduate work in the discipline. The requirement, whether satisfied by two languages or by one language and an alternative, must be met prior to the preliminary examination.

Students may receive credit for either semester of a hyphenated course without taking the other semester if they obtain written permission from the instructor and the Director of Graduate Studies.

For Seniors and Graduates

201-202. History of Russia, 1801-1917. Origins and dynamics of the Russian revolutionary movement, the intelligentsia, and the emergence of political parties. 3 units per semester. *Miller*

207-208. American Urban History. The history of American urbanization since the colonial period. Each student is responsible for the history of a particular city, with attention to the emerging methodology of urban studies. 6 units. *A. Scott*

209-210. Afro-American History, 1619-Present. An intensive study of the experience of Afro-Americans from colonial times to the contemporary age, emphasizing critical issues and giving special attention to Black institutional development. 6 units. *Gavins*

211. The United States and Latin America: A History of Inter-American Problems. American intervention, anti-Americanism, the United States in Latin American writings, Pan-Hispanism, investment and expropriation, the Pan-American movement, and defense of the Hemisphere. 3 units. *Lanning*

212. Recent Interpretations of United States History. A course designed to encourage a critical evaluation of major issues in United States history through examination of recent interpretations of key problems. 3 units. *Watson*

215-216. The Diplomatic History of the United States. 3 units per semester. *Davis*

219. Political Processes in Traditional and Modern Africa. See course description for Political Science 271. (Also listed as Political Science 271.) 3 units. *Hartwig and Johns*

221-222. Problems in the History of Late Medieval and Early Modern Europe. 6 units. *Witt*

223-224. The Old Regime and the French Revolution, 1661-1815. A study of social, political, and intellectual revolutions in continental Europe, centering on France and giving special attention to successive interpretations of historical change. 6 units. *Acomb*

229. Recent Interpretations of Modern European History. A course designed to develop the ability to appraise critical historical issues through the study and discussion of recent interpretations of key historical problems in modern European history. 3 units. *Parker*

230. The History of Spain. From the late medieval period to the present. 3 units. *TePaske*

231-232. The Hispanic Colonies and Republics in America. First semester: the Spanish Conquest, the church, race, and society; the development of universities, medicine, and science. Second semester: the wars of independence, the Mexican revolution since 1910, problems of land, education, and public health. 6 units. *Lanning*

233, 234. The Institutional, Cultural, and Social History of Hispanic America. 3 units per semester.

237, 238. Europe in the Middle Ages, 395-1500. 3 units per semester. *Young*

240. Aspects of Traditional and Modern African Culture. Introduction to the oral and written literatures and the musical and artistic traditions. 3 units. *Hartwig*

241-242. Modernization and Revolution in China. 6 units.

243-244. Afro-American History, 1619-Present. The experience of Afro-Americans with special attention to Black institutional development. 6 units. *Gavins*

247. History of Modern India and Pakistan, 1707-1857. Analysis and interpretation with special emphasis on changes in social and economic life. 3 units. *Embree*

248. History of Modern India and Pakistan, 1857 to the Present. 3 units. *Embree*

249-250. Social and Intellectual History of the United States. The interplay of ideas and social practice through the examination of attitudes and institutions in such fields as science and technology, law, learning, and religion. 6 units. *Holley*

261-262. Problems in Soviet History. Studies in the background of the Revolution of 1917 and the history and policies of the Soviet state. 6 units. *Lerner*

263-264. American Colonial History and the Revolution, 1607-1789. The founding and institutional development of the English colonies; the background, progress, and results of the Revolution. 6 units. *Alden*

265-266. Modern South America. Political, social, and economic history of leading South American nations from the mid-nineteenth century to the present. 6 units. *TePaske*

267-268. From Medieval to Early Modern England. The intellectual, social, and political problems of the transition to modern England, with special emphasis on the English Renaissance. 6 units. *Ferguson*

269. British History, 1688-1867. The Glorious Revolution, constitutional evolution, political methodology, Industrial Revolution, and reforms considered in context of the relationship of ideas and events. 3 units. *Cell and Hamilton*

270. British History from Mid-Nineteenth Century. Liberals and Conservatives, Irish Home Rule, the empire, wars and economic decline, the welfare state. 3 units. *Cell and Hamilton*

273, 274. Topics in the History of Science. Studies of critical stages in the evolution of scientific thought as well as of their intellectual context. 3 units per semester. *Mauskopf*

275-276. Central Europe, 1849-1914. Conflict between liberalism and authoritarianism, clash of nationalities, and domestic changes in Germany and Austria-Hungary. 6 units. *Hollyday*

277-278. The Era of the Civil War and Its Aftermath, 1820-1900. 3 units per semester. *Durden*

281-282. Development of Modern Medicine. 3 units per semester. *Brieger*

283-284. Political and Social Change in the United States, 1789-1860. 3 units per semester. *Nathans*

287-288. History of Modern Japan. Political, economic, and social development of Japan since 1750 with emphasis on factors contributing to Japan's emergence as a modern state. 3 units per semester. *Silberman*

290. East African History. Examination of major issues and research problems. 3 units. *Hartwig*

296. Canada from the French Settlement to the Present. Selected problems in the development of Canada and its provinces. 3 units. *Preston*

297. The British Empire in the Nineteenth Century (from 1783). The development of the Empire from the American Revolution to the imperialism that culminated in the South African War. 3 units. *Preston*

298. The Commonwealth in the Twentieth Century. The origins and evolution of the Commonwealth of Nations and its adjustment in the age of anti-colonialism. 3 units. *Preston*

For courses in ancient history which may be taken for credit in either history

or classical studies, see Classical Studies 253—*Greece to the Orientalizing Period*; 254—*The Age of the Tyrants and the Persian Wars*; 255—*The Age of Pericles*; 256—*The Fourth Century through Alexander*; 257—*Social and Cultural History of the Hellenistic World from Alexander to Augustus*; 258—*Social and Cultural History of the Graeco-Roman World*.

For Graduates

305-306. Seminar in British History. 3 units per semester. *Ferguson and Hamilton*

307-308. Seminar in United States History. 3 units per semester. *Davis, Durden, Holley, and Watson*

309-310. Seminar in American Colonial and Revolutionary History. 3 units per semester. *Alden*

317-318. Seminar in the History of Western Europe. 3 units per semester. *Colton, Parker, and Scott*

321-322. Seminar in the History of Spain, Hispanic America, and Inter-American Relations. 3 units per semester. *Lanning*

337-338. Seminar in Medieval History. 3 units per semester. *Young*

343-344. Seminar in the History of American Foreign Relations. 3 units per semester. *Davis*

347-348. Seminar in Modern India. 3 units per semester. *Embree*

353-354. Seminar on the Second British Empire and the Commonwealth of Nations. 3 units per semester. *Preston*

361-362. Seminar in the History of Russia. 3 units per semester.

371-372. Research Seminars. Offered in conjunction with colloquia listed below. 3 units per semester.

401. Seminar on the British Commonwealth. 3 units. *Braibanti, Preston, and Spengler*

Colloquia for Graduates

Each colloquium described below deals with an aspect of history by means of readings, oral and written reports, and discussion, with attention to bibliography. In some instances, students may take the equivalent of a research seminar in conjunction with the colloquium and will be credited with an additional 6 units by registering for 371.1-372.1, etc.

351.1-352.1. Military History. 3 units per semester. *Ropp*

351.2-352.2. Modern European Intellectual and Cultural History. 3 units per semester. *Parker*

351.10-352.10. Medieval Europe. 3 units per semester. *Young*

351.15-352.15. The English Renaissance. 3 units per semester. *Ferguson*

351.25-352.25. Central Europe, 1849-1914. 3 units per semester. *Hollyday*

351.30-352.30. European Diplomatic History Since 1870. 3 units per semester. *W. Scott*

351.31-352.31. Twentieth-Century Europe. 3 units per semester. *Colton*

351.40-352.40. City and Frontier in United States History. 3 units per semester. *A. Scott*

351.45-352.45. Reform and Politics in Nineteenth-Century America. 3 units per semester. *Durden*

351.46-352.46. Twentieth-Century United States to 1941. 3 units per semester. *Watson*

351.47-352.47. Diplomatic History of the United States. 3 units per semester. *Davis*

351.60-352.60. Soviet History. 3 units per semester. *Lerner*

351.65-352.65. Modernization and Revolution in China. 3 units per semester. *Uhalley*

351.70-352.70. Modern South Asia. 3 units per semester. *Embree*

Historiography and the Teaching of History—For Graduates

312. Seminar in the Teaching of History in College. The work in this course is intended to acquaint students with the problems involved in teaching history in college. It includes classroom observation and some teaching experience. Required of all candidates for the degree of Doctor of Philosophy who are in residence as many as two years at Duke. Year course. No credit. *Holley and Watson*

314. Historical and Social Science Methodology. Readings and short weekly papers in the wide range of theory developed by historians and social scientists and pertinent to the problems of historical interpretation. Year course. 6 units.

320. Historiography. A study of the great historians from Herodotus to Henry Adams and the new social science and humanities approaches to history. 3 units. *Parker*

History 314 or History 320 is required of all candidates for the degree of Doctor of Philosophy who are in residence as many as two years at Duke University.

Hospital Administration

Professor Frenzel, *Director* (224-B Baker House); Assistant Professor Smith, *Coordinator of Graduate Studies* (234-B Baker House); Associate Professor Swanson;

Instructor Schoonhagen; Adjunct Professor Gentry; Adjunct Assistant Professor Kaluzny

Graduate study leading toward preparation for a career of administration in hospitals and other health agencies is offered through a 24-month program leading to the M.H.A. degree. The program is composed of 45-48 graduate units, of which 27 are in hospital administration and 18-21 are in designated courses in other departments. Included in the program is a 12-month administrative residency, a period of supervised administrative experience conducted under faculty supervision in hospitals and other health agencies located within commuting distance of the University campus. Admission to this program is limited to 20 students per year; selection is based on suitability for management of health agencies as well as on capability for graduate study. As there are requirements for participation in the program in Hospital Administration in addition to basic admission requirements of the Graduate School, interested individuals should obtain complete information on prerequisites and selection procedures from the Coordinator of Graduate Studies.

201. History and Development of Hospitals and Other Health Agencies.

This course is designed to give the student a broad concept of the health field. It includes a study of the evolution of health institutions; analysis of medical care organizations in the United States, and the emergence of the health professions. 3 units. *Smith*

203-204. Principles of Organization and Management of Hospitals and Other Health Agencies. A study of the hospital as an institution including its administrative structure, relationship of the medical staff, and the organization and function of each department. At the same time study is made of the general principles underlying administration so that the student can relate these general principles to the hospital situation. Emphasis on the financial, legal, staffing, community relationship, and other managerial considerations of hospital administration. 6 units. *Frenzel, Smith, and Swanson*

207. Community Health Care. An analysis of the non-institutional components of the health care system, support services, and assessment criteria for the health services delivery system. 2 units. *Gentry and Kaluzny*

208. Planning and Utilization of Health Services. A quantitative examination of the health facilities system of the United States, with special emphasis on criteria for establishing need for facilities and for evaluating effectiveness of utilization of existing health care institutions and programs. 3 units. *Smith*

211-212. Seminars in Health Administration. A series of seminars designed to complement and add depth to the material covered during the first year, to analyze further the operation of hospitals and other health agencies, and to make the experiences of the residency meaningful. Attention will be given to formalized techniques of problem-solving, decision-making, human relations, communications, and relating day-to-day experiences to the management process. Special emphasis on social and economic aspects of health care and on identifying and projection current trends in the health field. 2 units per semester. *Frenzel and Smith*

215, 216. Administrative Residency. (One calendar year.) Varied experi-

ence is provided by rotation through the University Medical Center, a community hospital, a Veterans Administration and a special hospital, a public health department, a prepayment plan, and other governmental and voluntary health agencies. Two months of residency will be spent in field experience with the Hospital Section of The Duke Endowment. An administrative project will be undertaken during residency and a formal written and oral report of the project is required. 3 units per semester. *Staff and Preceptors*

221. Public Policy and Health. An examination of the forces affecting the formulation of public policy for health services; special emphasis will be placed on the policy-making structure and process by the case study approach, with particular consideration of the effect of public policy on the organization of health services and their delivery. 2 units. *Staff*

222. The Economics of Health. An analysis of the economic dimensions of illness and of the health care delivery system; consideration of the application of principles of non-market place economics to the health service delivery system; examination of the various schemes for financing health services and the effects of the method of financing on the health delivery system. 2 units. *Staff*

253. Computer Science. Components and organization of a computer system, automatic programming languages, storage and retrieval systems (TSAR), equation fitting by iteration and least squares methods, and graphical techniques. 3 units. *Chapman*

258. Operations Research. Mathematical model formulation and development of techniques to aid decision-making in problems of natural resource allocation and use. Includes theory and techniques of inventory control, equipment replacement planning, queuing theory, competitive strategies, allocation, sequencing and dynamic programming. Consideration is given to both deterministic and non-deterministic models. 3 units. *Staff*

271. Financial Management. Analyses of problems of managing financial affairs of the firm. Review is made of accounting policy. Subjects considered include flow, working capital, and long-term capital budgeting; options affecting the development of an optimum financial structure; and effective utilization by management of meaningful financial statements and reports. The course combines lectures and case studies, some in health institutions. 3 units. *Staff*

272. Business Policy. Through analyses of problems from the top management viewpoint the student is given practice in arriving at courses of action for solving business problems. Also analyzed are mechanisms by which a firm establishes objectives, means by which objectives are reached, and restraints which affect courses of action. Effects of various forces at work in the complex organization are studied. Decision theory and long- and short-term decision processes are applied. The course will utilize case studies, some in health institutions, and lectures. 3 units. *Staff*

300. Special Project. Directed study, leading to a written paper, of a selected topic in hospital and health services administration. 1 to 3 units. *Staff*

Marine Sciences—The University Program

Professor Costlow, *Director*; Professors Bookhout (Zoology) and Johnson (Botany); Associate Professors Barber (Zoology and Botany), Pilkey* (Geology), and Searles* (Botany); Assistant Professors Forward (Zoology), Gutknecht* (Physiology), Sullivan (Biochemistry), and Sutherland (Zoology)

Training in the marine sciences at Duke University includes marine biology, marine geology, and oceanography. The departments which are chiefly concerned are Botany, Chemistry, Geology, and Zoology.

A graduate student working in the marine sciences will take his degree under the auspices of one of the above departments and must, therefore, meet the requirements of that department. During the first part of his training he will usually take courses on the Durham campus during the academic year and enroll in more specialized courses in the marine sciences at the Duke University Marine Laboratory during the summer. After the completion of his course work and preliminary examination (for doctoral candidates) he may, with approval of his major professor, request space for thesis research at the Marine Laboratory.

Persons interested in graduate work in marine sciences should apply through one of the appropriate departments. Forms may be obtained from the Graduate School.

Applications for summer courses at the Laboratory should be addressed to the Director, Duke University Marine Laboratory, Beaufort, North Carolina 28516. The form may be obtained from the Duke University *Marine Laboratory Bulletin*. The application for enrollment in the Duke University summer session should be accompanied by transcripts of undergraduate and graduate work. Applications should be received before March 10.

Students registering for Research should do so under the appropriate departmental numbers.

The following courses are offered during the summer at Beaufort. See the Duke University *Marine Laboratory Bulletin* for the current schedule of courses.

203. Marine Ecology. Ecological processes as exemplified by marine organisms; environmental factors, intra- and interspecific relationships; community ecology. Readings, discussions, written papers, and computer use. Field projects using modern methods. Prerequisites: a course in general biology, invertebrate zoology, or the equivalent, and a year of mathematics; some knowledge of statistics will be helpful. (Given at Beaufort.) (Also listed as Zoology 203.) 6 units. *Sutherland*

205. Geological Oceanography. The study of the broad geologic aspects of the ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary process. Observations in the field will be emphasized and will include training in sampling procedures for both shallow and deep water. This course is not open to students who have completed Geology 206. (Given at Beaufort only.) (Also listed as Geology 205.) 6 units. *Pilkey*

S205. Introductory Marine Microbiology. The biology of microorganisms in oceans and estuaries. Prerequisite: one year of college biological science. (Also listed as Botany 205.) 6 units. *Johnson and Searles*

*In residence at the Marine Laboratory during the summer only.

211. Marine Phycology. An introduction to marine algae: their identification, taxonomy, morphology, physiology, and ecology. Field trips complemented by laboratory study, culturing, and preparation of herbarium material. (Also listed as Botany 211.) 6 units. *Searles*

212. Marine Membrane Physiology. Physiology of marine and estuarine organisms, with emphasis on cellular transport processes and electrophysiology. The course will include the mechanisms, functions, and comparative aspects of ionic and osmotic regulation in marine plants and animals. Prerequisite: permission of instructor. (Also listed as Physiology 212.) 6 units. *Gutknecht, Schoffeniels, Wachtel, and Staff*

214. Biological Oceanography. Composition in time and space of marine biosphere in relation to descriptive marine chemistry, physics, and geology. Some work at sea aboard the research vessel. Prerequisites: a course in invertebrate zoology, ecology, marine biology or an appropriate equivalent; chemistry through organic, one year of physics and mathematics. (Given at Beaufort.) (Also listed as Zoology 214.) 6 units. *Barber*

240. Chemical Oceanography. Physiocochemical properties of seawater. Lectures, laboratory work, and field trips. Prerequisite: a year of analytical or physical chemistry, an introductory course in general or physical oceanography or permission of the instructor. (Also listed as Chemistry 240 and Zoology 240.) (Given at Beaufort.) 6 units. *Staff*

250. Physiological Ecology of Marine Animals. A study of the physiological responses of marine animals in relation to certain environmental factors and evolution. Animals representing numerous phyla from various habitats are studied. Prerequisite: a course in physiology. (Given at Beaufort.) (Also listed as Zoology 250.) 6 units. *Forward*

274. Marine Invertebrate Zoology. Structure, functions, and habits of invertebrate animals under normal and experimental conditions. Field trips will be made to study, collect, and classify animals in their natural habitats. Prerequisite: introductory college biology. (Given at Beaufort.) (Also listed as Zoology 274.) 6 units. *Staff*

276. Comparative and Evolutionary Biochemistry. Lectures and discussion of the origin of life, evolution of the genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Techniques used include salt fractionation, electrophoresis, ion exchange and molecular exclusion chromatography, fingerprinting, molecular weight determination, amino acid composition, and other related approaches. Prerequisite: consent of the instructor. (Given at Beaufort.) (Also listed as Biochemistry 276 and Zoology 276.) 6 units. *Staff*

278. Invertebrate Embryology. Lectures, readings, and laboratory work dealing with rearing, development, and life history of invertebrates. (Also listed as Zoology 278.) 4 units. *Bookhout*

Mathematics

Professor Shoenfield, *Chairman* (135C Physics Building); Associate Professor Burdick, *Director of Graduate Studies* (135D Physics Building); Professors Carlitz, Dressel, Murray, Warner, Weisfeld, and Woodbury; Associate Professors Hodel, Kitchen, Smith, and Stackelberg; Assistant Professors Henson, Herr, Kraines, Lees, MacKichan, Moore, O'Fallon, Scoville, Wilkinson, and Wong; Adjunct Professor Sewell

Graduate work in the Department of Mathematics is offered leading to the A.M. and Ph.D. degrees. The student, in his undergraduate work, must have had courses in differential and integral calculus, and at least 6 semester hours of other courses in mathematics on the junior or senior level.

All degree candidates are required to pass a comprehensive examination in the areas of algebra, analysis, and topology. Students will normally take the comprehensive examination after completing their first year of graduate study and just prior to the start of their second year.

The A.M. degree with a major in mathematics is awarded primarily on the basis of scholarship. It requires 30 units of graded course work in addition to the comprehensive examination. A thesis may be substituted for 6 units of course work only in unusual circumstances.

The Ph.D. degree in mathematics is awarded upon the demonstration of ability and training in research. The original dissertation, therefore, is the most important of the formal requirements for the degree.

All students are expected to participate in a proseminar during their first year of graduate study. The purpose is to provide experience in organizing and presenting material to their peers.

Since a reading knowledge of French, German, and Russian is highly desirable for a student of mathematics, he should satisfy the language requirement in one of these languages as early as possible. The department urges students to attain a reading knowledge of at least two of these languages. Members of the faculty remain free to assign readings in them for course work or dissertation work.

For Seniors and Graduates

204. Geometry for Teachers. Metric and synthetic approaches to plane and solid geometry; affine geometry; an algebraic model of Euclidean geometry. 3 units. *Reynolds*

207, 208. Introduction to Algebraic Structures. Groups, rings, fields; isomorphism theorems; partial and total orderings; characterizations of basic number systems; permutation groups; finitely generated Abelian groups; polynomial rings; principal ideal domains; division and Euclidean algorithms; vector spaces; linear transformations and matrices; bilinear forms; multilinear algebra; determinants, finite dimensional inner product spaces. Prerequisite: Mathematics 68 or 73 for 207; and 207 for 208. 3 units per semester. *Staff*

217, 218. Intermediate Analysis. The real and complex number systems, sequences and series, continuity, differentiation, integration. Prerequisite: Mathematics 74 for 217; and 217 for 218. 3 units per semester. *Staff*

221, 222. Numerical Analysis. See course description for Computer Science 221, 222. (Also listed as Computer Science 221, 222.) 3 units per semester. *Gallie*

***227, 228. Theory of Numbers.** Congruences, arithmetic functions, compound moduli, quadratic reciprocity, Gauss sums, quadratic forms, sums of squares. Prerequisite: calculus. 3 units per semester. *Carlitz*

***229, 230. Algebraic Numbers.** Ideals, unique factorization, divisors of the discriminant, determination of the class number. Prerequisite: theory of equations. 3 units per semester. *Carlitz*

***234. Sample Designs.** Methods of constructing and analyzing survey designs; elements of simple random sampling, stratified sampling, multi-stage sampling; methods of estimation; questionnaire construction refusals and not-at-homes. Prerequisite: Mathematics 133. 3 units. *Staff*

235, 236. Algebra. Elementary categorical algebra; groups with operators, G-sets, structure of groups; commutative algebra; principal ring modules; structure of rings and modules; field theory. Prerequisite: Mathematics 208 or equivalent for 235; and 235 for 236. 3 units per semester. *Staff*

***244. Design of Experiments.** Methods of constructing and analyzing designs for experimental investigations, Latin square, split-plot, simple and partially confounded factorial designs, incomplete block designs, treatment of missing data, techniques of experimentation. Prerequisite: Mathematics 133. 3 units. *Burdick*

***245, 246. Combinatorial Analysis.** Generating functions, permutations, distributions, partitions, compositions, trees, and networks. Prerequisite: calculus. 3 units per semester. *Carlitz*

***247, 248. Arithmetic of Polynomials.** Field theory, detailed study of finite fields, special polynomials and functions, valuation theory, the zeta function. Prerequisite: Mathematics 236 or consent of the instructor. 3 units per semester. *Carlitz*

***262. Non-Parametric Statistics.** A study of statistical tests in which no assumption about the underlying distribution is made; one sample, two sample, k sample tests for nominal, ordinal and interval scales; non-parametric measures of correlation, efficiency of tests. Prerequisite: Mathematics 244 or consent of the instructor. 3 units. *Staff*

265, 266. Homological Algebra and its Applications. Categorical algebra; derived categories and homology; sheaves and their cohomology; applications to smooth manifolds and to complex manifolds; preschemes and schemes and their local cohomology. Prerequisites: 236 and 271, or consent of instructor. 3 units per semester. *Weisfeld*

271, 272. Introductory Topology. Basic set theory; topological spaces; separation axioms; metric spaces; continuity; connectedness; paracompactness. Prerequisite: calculus. 3 units per semester. *Staff*

*Offered on demand.

***273, 274. Algebraic Topology.** Homology and cohomology theories; complexes; introduction to homotopy groups; Čech homology theory. Prerequisite: Mathematics 271-272. 3 units per semester. *Kraines*

***275, 276. Probability.** Foundations of probability. Random variables; distributions; central limit problem; law of large numbers; limit and ergodic theorems. Prerequisites: Mathematics 135 or calculus, and consent of the instructor. 3 units per semester. *Stackelberg*

283. Applied Mathematical Statistics. Basic probability concepts, the sample space, discrete and continuous events, permutations and combinations, conditional and marginal probability, discrete and continuous distributions, expected values and moments, sampling distributions, estimation, hypothesis testing, confidence intervals, basic queuing theory. Prerequisite: Mathematics 74. 3 units. *Herr*

284. Least-Squares Analysis of Linear Models. General linear models; geometrical interpretations; multiple regressions; one-way and multi-way analysis of variance; fixed, random, and mixed models; experimental design models; analysis of covariance; introduction to non-linear models. Prerequisite: Mathematics 136 or 283. 3 units. *Burdick*

285. Applied Mathematical Methods I. Vectors, line and surface integrals, tensors, complex variables, differential and integral equations. Prerequisite: Mathematics 74. 3 units. *Dressel and Wong*

286. Applied Mathematical Methods II. Wave equation, Fourier series, heat equation, telegraphic equations. Legendre polynomials, Bessel functions, Schrodinger's equation. Prerequisite: Mathematics 74. 3 units. *Dressel and Wong*

***287, 288. Foundations of Mathematics.** Propositional calculus, predicate calculus, axiomatized number theory. Gödel completeness and incompleteness theorems. Recursive functions; hierarchies; constructive ordinals. Set theory; consistency of the axiom of choice. Prerequisite: Mathematics 208 or Philosophy 103, or consent of the instructor. (Also listed as Philosophy 287, 288.) 3 units per semester. *Henson*

290. Stochastic Processes. Foundations and probabilistic structure of stochastic processes; sample function properties, processes with finite second-order moments, stationary processes; representations. Prerequisite: Mathematics 275. 3 units. *Wilkinson*

***297, 298. Axiomatic Set Theory.** Statement and development of Zermelo-Fraenkel axioms. Consistency and independence problems. New axioms and their consequences. Prerequisite: consent of the instructor. 3 units per semester. *Shoenfield*

For Graduates

***303, 304. Advanced Theory of Numbers.** Cubic and quartic reciprocity, partitions and diophantine analysis, sums of squares. Prerequisite: Mathematics 228, or consent of instructor. 3 units per semester. *Carlitz*

*Offered on demand.

325, 326. Analysis III, IV. Advanced topics in complex and real analysis, measure and integration theory, functional analysis. Prerequisite: Mathematics 292 for 325; and 325 for 326. 3 units per semester. *Scoville*

***327, 328. Partial Differential Equations.** Boundary and initial value problems, regularity and existence theorems by methods of *a priori* estimates and functional analysis. Representations of solutions, spectral theory, and potential theory. Prerequisite: Mathematics 291-292, or consent of the instructor. 3 units per semester. *Staff*

***329, 330. Theory of Distributions.** Test functions, distributions, topological vector spaces, applications to the operational calculus, partial differential equations, and mathematical physics. 3 units per semester. *Staff*

***331, 332. Advanced Topics in Complex Variables.** Entire and meromorphic functions; harmonic functions and potential theory; Riemann surfaces; several complex variables. 3 units per semester. *Staff*

***333, 334. Analytic Theory of Numbers.** Distribution of primes, primes in an arithmetic progression, Waring and Goldbach problems, applications of elliptic functions. Prerequisite: Mathematics 291-292. 3 units per semester. *Carlitz*

***335, 336. Topics in Algebra.** Advanced topics in algebra to be selected from areas of current research. Prerequisite: Mathematics 236 or consent of the instructor. 3 units per semester. *Smith*

***343, 344. Differential Equations.** Manifolds, sheaves, differential operators and their prolongations, Spencer sequences, δ -cohomology, existence theorems for analytic partial differential equations, the δ -estimate, D-Neumann problem. Prerequisites: Mathematics 236, 272, and 292, or consent of the instructor. 3 units per semester. *Weisfeld*

***353, 354. Topics in Analysis.** Advanced topics in real and complex analysis to be selected from areas of current research. Prerequisite: Mathematics 325, which may be taken concurrently. 3 units per semester. *MacKichan*

361, 362. Hilbert Space. Spectral theory for Hermitian and unitary transformations; maximal symmetric transformations; canonical resolution of closed transformations; singular integral equations; the Weyl circle; indices for differential operators; deficiency characteristics of closed transformations; topologies for bounded transformations; von Neumann algebras; resolution theory; Abelian and factor rings. Prerequisites: Mathematics 236 and 292, or consent of instructor. 3 units per semester. *Murray*

***371, 372. Dimension Theory.** Theory of covers in normal spaces; inductive and covering dimension of metric spaces and of normal spaces; dimension of Euclidean spaces; mapping in spheres and applications; metric dimension and other metric-dependent functions. Prerequisites: Mathematics 271-272. 3 units per semester.

***377, 378. Topics in Topology.** Advanced topics in topology to be selected from areas of current research. 3 units per semester. *Hodel*

*Offered on demand.

***383, 384. Lie Groups and Algebras.** Differential manifolds; Lie groups; one-parameter subgroups; Lie algebras; differential forms; classification and representations of compact Lie groups and semisimple Lie algebras; solvable and nilpotent algebras; Ado's theorem. Prerequisites: Mathematics 236, 271, and either Mathematics 218 or 291. 3 units per semester. *Shoenfield*

***392. Nuclear Spaces.** The theory of nuclear locally convex spaces, as developed by Grothendieck and Pietsch; applications to spaces of distributions. Prerequisite: Mathematics 292. 3 units. *Moore*

***393. Topological Groups.** Elementary theory; Haar measure; compact groups; locally compact Abelian groups; duality theory. Prerequisites: Mathematics 236 and 272, or consent of instructor. 3 units. *Warner*

***394. Topological Rings.** Compact, locally compact, and linearly compact rings. Prerequisite: Mathematics 393, or consent of instructor. 3 units. *Warner*

***395, 396. Topological Algebra.** Normed and locally convex spaces, Banach algebras. Prerequisites: Mathematics 236 and 292, or consent of the instructor. 3 units per semester. *Moore*

***397, 398. Seminar in Algebra and Number Theory.** Prerequisite: consent of the instructor. 3 units per semester. *Carlitz*

Microbiology and Immunology

Professor Joklik, *Chairman* (Research Park IV); Professor Day, *Director of Graduate Studies* (4546 Clinical Research I); Professors Amos, Beard, Conant, and Willett; Associate Professors Buckley, Burns, Metzgar, Osterhout, and Wheat; Assistant Professors Lauf, Luftig, Nichols, Oleinick, Rosse, Scott, Smith, Vanaman, Ward, and Zweerink

The department offers A.M. (with or without thesis) and Ph.D. degrees in microbiology with specialization possible in any of six areas: (1) cell biology (mammalian, avian, and microbial), (2) microbial physiology, (3) immunochemistry, (4) medical bacteriology and mycology, (5) immunogenetics, and (6) general immunology. Undergraduate preparation in biochemistry is strongly urged. A brochure may be requested from the Director of Graduate Studies, Box 3045, Duke Medical Center, which describes the degree program, the special requirements, and the fellowships available.

215. Bacteriophage: Structure and Function. Classical experiments of Luria, Hershey, and Delbruck. Timing of events during infection. Morphogenesis of component substructures and their subsequent assembly into mature virions. Analysis of electron micrographs. Interactions of bacteriophage with host-cell walls and membranes. These areas will be covered in the context of coliphages. (Also listed under the University Program in Genetics.) Fall. 2 units. *Luftig and Nichols*

219. Molecular and Cellular Basis of Development. See course description for Anatomy 219. (Also listed as Anatomy 219, Biochemistry 219, Pathology 219, and Physiology 230.) 3 units. *Counce, McCarty, and Staff*

*Offered on demand.

219S. Seminar. Optional seminar offered in conjunction with Microbiology 219.

251. Biochemistry of Development. Current concepts of control mechanisms in embryonic development and differentiation discussed at the cellular, biochemical, and molecular level. (Also listed as Biochemistry 280.) 2 units. *McCarty, Harris, and Joklik*

252. Virology. The structure and replication of mammalian viruses with emphasis on the molecular and functional aspects. Particular attention will be paid to those virus host systems which possess features which can be exploited for answering questions of universal interest. 2 units. (Spring.) *Joklik and Zweerink*

281. Bacterial Physiology I. The structure, composition, growth, and metabolism of bacterial cells. Special emphasis will be given to those processes peculiar to bacteria. 3 units. *Wheat and Willett*

282. Bacterial Physiology II. The molecular biology of bacterial cells including a detailed analysis of DNA, RNA, and protein synthesis with emphasis on genetic and metabolic regulatory mechanisms. 3 units. *Burns and Vanaman*

291. Immunology I. Structure and function of immunoglobulins. Characteristics of synthetic and natural antigens. Cellular aspects and kinetics of antibody formation. Forms of immunologic responsiveness. Elicitation and control of immune response. Phylogeny and ontogeny of immunity. Specificity and cross-reactivity. Methods of immunologic analysis. Tolerance, enhancement, autoimmunity, and allergy. 4 units per semester. *Staff*

292. Immunology II. Structure and function of immunoglobulins. Characteristics of synthetic and natural antigens. Cellular aspects and kinetics of antibody formation. Forms of immunologic responsiveness. Elicitation and control of immune response. Phylogeny and ontogeny of immunity. Specificity and cross-activity. Methods of immunologic analysis. Tolerance, enhancement, autoimmunity, and allergy. 4 units per semester. *Staff*

For Graduates

304. Basic Medical Virology. Introduction to the molecular biology of major virus groups; cellular and host responses to, and the epidemiology and pathogenesis of, viral infections; DNA and RNA tumor viruses and their possible role in malignancy; bacteriophage as model systems. (Spring, fall 1972.) 2 units. *Lang, Zweerink, and Staff*

311. Immunochemistry. The structure of antibodies. The nature of the combining site. Forces involved in antigen-antibody interaction. Specificity, avidity, and cross-reactivity. Antibodies as analytical reagents. Haptens. Synthetic and natural antigens. Biologically active substances as antigens. (Alternate fall semesters; 1971, 1973.) 3 units. *Day*

313. Immunohematology. A lecture course covering historical and current concepts of blood cell antigens and antibody. Emphasis will be placed on the genetics, urology, chemistry, and anthropological aspects of human red cell iso-

antigens and antibodies. White cell and platelet antigens, the hemotological consequences of immunological reactions involving the cellular elements of the blood, and comparative blood group antigens in other species will also be considered. 2 units. *Rosse*

323. Readings in Bacteriology and Immunology. A course of readings and syntheses in restricted areas of bacteriology and immunology, under the direction of individual staff members. 2 units.

325. Medical Mycology. This course is intended to familiarize the graduate student majoring in mycology with the fungi-causing disease in man and animal. The course includes practical laboratory work with materials from patients in Duke Hospital and those sent to the Duke Fungus Registry from outside sources. Prerequisites: A.M. in botany with major in mycology and Microbiology 221. Maximum registration: four students. 4 units. *Conant*

330. Medical Immunology. Basic study of immune responses to antigenic substances. Special topics: congenital and acquired immunological deficiencies; humoral and cellular hypersensitivity; immunology and infectious diseases; immunohematology; autoimmune disease; the immunogenetics of transplantation; tumor specific immunity. Case presentations where indicated and student seminars. (Fall 1971, spring 1973.) 6 units. *Amos, Buckley, and Oleinick*

331.1-331.8. Microbiology Seminar. Current topics in microbiology with seminars presented by students, faculty, and outside speakers. Required course for all first-year students in microbiology and immunology, and for all advanced students specializing in immunology. 1 unit per semester. *Staff*

332.1-332.8. Immunology Seminar. Current topics in immunology with seminars presented by students, faculty, and outside speakers. Required course for all first-year students in microbiology and immunology, and for all advanced students specializing in microbiology. 1 unit per semester. *Staff*

336. Immunogenetics. Production of inbred and coisogenic strains. Mutation and recombination in inbred animals and tumors. Genetic control of histocompatibility iso-antigens in tumors and normal tissues, differential gene action in hybrids and tumors. Antigenic and immunologic factors in homograft rejection, tests for genetic compatibility. Modification of the immune response by genetic or immunologic procedures—tolerance, enhancement, suppression of antigens. (Also listed under the University Program in Genetics.) 2 units. *Amos*

371. Animal Cell Biology. An introduction to morphology, fractionation, characterization, and synthesis of cellular organelles (chromosomes, membranes, ribosomes, nucleoli, lysosomes). The use of tissue-culture systems for studying cellular functions, synthesis of nucleohistones, the mitotic cycle. Spring, alternate years with Microbiology 251. (Also listed as Biochemistry 371.) 2 units. *Joklik, McCarty, and Staff*

386. Viral Oncology. Topics will include a review of the nature of cancer, the theories of carcinogenesis, cancer in humans, and chemical and viral carcinogenesis. The emphasis will be on developing an understanding of the experimental approach to cancer, which currently involves the induction of cancer by viruses

and chemicals. The course will be informally structured, with lectures restricted to introductory material, and student participation geared to in-depth understanding. (Spring.) 2 units. *Smith*

420. Cellular Immunophysiology. See course description for Physiology 420. (Also listed as Physiology 420.) 2 units. *Lauf and Staff*

Pathology

Professor Kinney, *Chairman* (301B Medical School); Professor Sommer, *Director of Graduate Studies* (301 Medical School); Professors Fetter, Hackel, Vogel, and Wittels; Associate Professors Pratt, Elchlepp, Klintworth, Ratliff, Bradford, Johnston, Wilson; Adjunct Associate Professor Kozma; Assistant Professors Sage, Spooner, and Tisher

The Department of Pathology offers graduate work leading to the Ph.D. degree with areas of specialization such as subcellular and molecular pathology. Course work is designed to give a broad background in classical and modern pathology with emphasis on the application of biophysical, biomathematical, and biochemical approaches. Students will be required to take such courses as are necessary to obtain this foundation, and as are best adapted to areas of speciality and research. Further information including brochures giving details of departmental facilities, staff, trainee stipends, and the M.D.-Ph.D. program are available from the Director of Graduate Studies.

219. Molecular and Cellular Basis of Development. For a description of the course see Anatomy 219. (Also listed as Anatomy 219, Biochemistry 219, Microbiology 219, Pathology 219, and Physiology 230.) 3 units. *Counce, McCarty, and Staff*

219S. Seminar. Optional seminar offered in conjunction with Pathology 219.

250. General Pathology. The fundamentals of pathology are presented to the student. Lectures developing broad concepts of disease processes are given by the members of the senior staff. The emphasis is placed on etiology and pathogenesis of disease. Lecture. Prerequisite: histology and permission of instructor. 4 units. *Kinney and Staff*

251. Laboratory Course in General Pathology. Laboratory session to complement 250. Gross and microscopic material is correlated with, and related to, disease processes. Pathology 250 may be taken concurrently. Prerequisite: histology and permission of instructor. 4 units. *Kinney and Staff*

325. Cardiovascular Pathology. Cardiovascular disease processes will be studied, reviewing anatomic, embryologic, and physiologic features, and utilizing case material and gross and microscopic specimens. Consideration will be given to principles of electrocardiography. (Fall only.) 3 units. *Hackel and Ratliff*

352. Basic Problems in Chemical Pathology. This is an advanced seminar tutorial course in which the biochemical and physiological expressions of morphologic abnormalities will be explored. Specific organ systems will be used as a model

for instruction and discussion. Experimental approaches toward solutions of problems will be discussed. Prerequisite: permission of instructor. 2 units. *Wittels*

353. Advanced Neuropathology. This course deals with current problems and research methods related to diseases which affect the nervous system. Prerequisite: permission of instructor. (Fall only.) 2 units. *Vogel*

355, 356. Graduate Seminar in Pathology. Discussions outlining the scope of modern pathology. This will include reports of original researches by members of staff and visitors. Time to be arranged. 1 unit each semester. *Sommer and Staff*

357. Research in Pathology. Independent research projects in various fields of pathology. Time and credit to be arranged. *Kinney and Staff*

358. Cellular and Subcellular Pathology. This course is designed for students wishing to broaden their knowledge of cellular structure and cellular pathology. The course consists of lectures and seminars discussing the alterations in cellular structure and associated functions that accompany cell injury. Prerequisite: permission of instructor. *Sommer*

360. Topochemistry. This course is designed for students who wish an understanding of the theoretical and practical basis of methods for the topographic localization of chemical constituents of cells and tissues. The course consists of lectures and laboratory sessions which emphasize modern techniques for tissue preservation and localization and identification of natural products and enzymes. Students will be encouraged to work on a selected project. Given in even years beginning in 1972, spring. 2 units. *Sommer and Staff*

361, 362. Autopsy Pathology. A detailed consideration of the morphologic, physiologic, and biochemical manifestations of disease. Emphasis is on individual work in the laboratory with tutorial supervision. Gross dissection, histologic examination, processing, and analyzing of morphologic, microbiologic, and biochemical data, and interpretation of results. Prerequisites: Pathology 350 and permission of instructor. 3 units per semester. *Kinney and Staff*

364. Systemic Pathology. Systematic presentation of the characteristics of disease processes as they affect specific organ systems in mammals. 6 units. *Hackel and Staff*

367, 368. Special Topics in Pathology. Special problems in pathology will be studied with a member of the senior staff; the subject matter will be individually arranged. Time to be arranged. 4 units. *Kinney and Staff*

369. Ophthalmic Pathology. This course will consist of lectures, seminars, and laboratory sessions. The normal anatomy and embryology of the eye will be reviewed as a basis for the study of the various ocular disease processes. The more common diseases of the eye will be considered in detail. Problems in ophthalmic pathology will be discussed together with methods of solving them. (Fall only.) 3 units. *Klintworth*

370. Developmental Pathology and Teratology. A systematic study of disease processes involving the prenatal, natal, and postnatal period. Emphasis will be placed on developmental anatomy and teratogenesis. The format includes

seminars and clinicopathologic correlations derived from gross and microscopic material. Prerequisites: Pathology 350, anatomy, and histology. (Fall only.) 3 units. *Bradford, Wilson, and Kozma*

371. Comparative Pathology. This course will deal with the basic mechanisms of diseases of various animal models for biomedical research. Included will be discussion of the more common spontaneous diseases encountered in several species of experimental animals. Emphasis will be on the comparisons of different diseases of animals as they pertain to human disease. Prerequisite: permission of instructor. 2 units. *Kozma*

372. Reaction to Drug Injury. This course is designed to acquaint the student with pathological effects of drugs in humans and laboratory animals. Histo-pathological, biochemical, mutagenic, and teratogenic effects of specific drugs will be discussed. Design of preclinical studies for the safety evaluation of drugs will be given. Diagnostic problems and methods of diagnosis of drug induced diseases will be covered. Prerequisite: biochemistry, pharmacology, and permission of instructor. 2 units. (Fall only.) *Kozma*

373. Cytopathology. This course is designed to present the principles and techniques by which basic cytology is applied to the diagnostic interpretation of disease. Classroom and laboratory work will include diseases involving the female genital tract, respiratory tract, urinary tract, effusions, gastrointestinal tract, and central nervous system. Neoplastic disease will be emphasized. Practical application of the acquired knowledge will be made in examining current material. Prerequisites: Pathology 350, 351, or permission of instructor. (Fall.) 3 units. *Johnston and Staff*

Philosophy

Professor Welsh, *Chairman* (201K West Duke Building); Associate Professor Mahoney, *Director of Graduate Studies* (201J West Duke Building); Professors Negley and Peach; Associate Professors Sanford and Roberts; Assistant Professors Aquila and Coder

The Department of Philosophy offers graduate work leading to the A.M. and Ph.D. degrees. Tutorial work complements formal instruction. Students may specialize in any of the following fields: the history of philosophy, logic, philosophy of science, epistemology, metaphysics, philosophical analysis, ethics, aesthetics, political philosophy, and philosophy of law.

Individual programs of study are developed for each student. The following requirements, however, are fundamental: (1) In February of their first year new graduate students are required to take two or three qualifying examinations, diagnostic in purpose. One examination is in the history of philosophy, ancient and modern; a second examines his ability to deal critically and systematically with some basic philosophical topic; a third examination, in logic is required of anyone who has not taken Philosophy 241. (2) The preliminary examinations for the Ph.D., which may be taken only after a student has met the language requirement for that degree, should be taken after the second year of study. In these examinations students are expected to combine historical knowledge with critical understanding.

Work in a minor field, not necessarily confined to any one department, must include six units for the A.M. or the Ph.D. and may include more as a student's program requires or permits.

A student who meets the general requirements of the Graduate School for the A.M. degree may earn this degree by passing an examination for a reading knowledge of a foreign language and the preliminary examinations for the Ph.D. degree or by writing and successfully defending a master's thesis.

A reading knowledge of at least one foreign language, ancient or modern, is required for the Ph.D. degree. No student may take his preliminary examinations until he has demonstrated this ability. More than one language may be required where this is judged appropriate to the research demanded by the candidate's dissertation.

For Seniors and Graduates

202. Aesthetics: The Philosophy of Art. A study of some fundamental issues in aesthetics with particular reference to the fields of literature, music, and painting. Problems discussed include the role of standards in criticism, aesthetic judgment, interpretation, and evaluation in literature, meaning in the arts, art and truth, the arts and morality. 3 units. *Welsh*

203. Contemporary Ethical Theories. Study of the nature and justification of basic ethical concepts and principles in the light of the chief ethical theories of twentieth-century British and American philosophers. 3 units.

204. Philosophy of Law. Natural law theory and positivism; the idea of obligation (legal, political, social, moral); and the relation of law and morality. 3 units.

205. Philosophy of History. Discussion of the method, metaphysical implications, and influence of interpretations of history: Hegel, Marx, Spengler, Toynbee. 3 units. *Negley*

208. Political Values. Analysis of the systematic justification of political principles and the status of political values in the administration of law. 3 units. *Negley*

211. Plato. A critical study of selected dialogues with special emphasis on problems in epistemology and metaphysics. 3 units. *Mahoney*

217. Aristotle. A study of passages from the *Organon*, *Physics*, *De Anima*, and *Metaphysics*. 3 units. *Mahoney*

218. Medieval Philosophy. A critical examination of selected problems in medieval philosophy. 3 units. *Mahoney*

***219. Kant's Moral Philosophy.** 3 units. *Negley*

†**225. British Empiricism.** A critical study of the writings of Locke, Berkeley, or Hume, with special emphasis on problems in the theory of knowledge. 3 units. *Peach*

*Offered on demand.

†Not offered in 1972-73.

227. Continental Rationalism. A critical study of the writings of Descartes, Spinoza, or Leibniz, with special emphasis on problems in the theory of knowledge and metaphysics. (1972-73: Descartes.) 3 units. *Peach*

228. Recent and Contemporary Philosophy. A critical study of some contemporary movements in philosophy with special emphasis on the work of Moore, Russell, Wittgenstein, Wisdom, and Ryle. 3 units. *Welsh*

***229. American Pragmatism.** Studies in the philosophy of Pierce, James, Dewey, and Mead. 3 units. *Welsh*

230. The Meaning of Religious Language. See course description for Religion 230. (Also listed as Religion 230.) 3 units. *Poteat*

231. Classical German Philosophy. Selected topics in eighteenth and nineteenth century German philosophy. 3 units. *Aquila*

232. Recent Continental Philosophy. Selected topics. 3 units. *Aquila*

233. Methodology of the Empirical Sciences. An introduction to recent philosophical discussion of a variety of problems, e.g., the concept of a scientific explanation, the nature of laws, theory and observation, and other topics. Approval of the instructor is required for undergraduates and for students from departments other than Philosophy. 3 units. *Roberts*

234. Problems in the Philosophy of Science. Selected problems in the physical and non-physical sciences, e.g., space and time, measurement, probability and induction, the philosophy of the behavioral and social sciences. Approval of the instructor is required for undergraduates and for students from departments other than Philosophy. 3 units. *Roberts*

241. Symbolic Logic. Detailed analysis of deduction and of deductive systems. 3 units. *Coder*

***250. Philosophical Analysis.** A critical study of recent and contemporary essays in philosophical analysis, and an evaluation of the nature, methods, and results of this movement. 3 units.

251. Epistemology. Selected topics in the theory of knowledge, e.g., conditions of knowledge, scepticism and certainty, perception, memory, knowledge of other minds, and knowledge of necessary truths. 3 units. *Sanford*

252. Metaphysics. Selected topics in metaphysics, e.g., substance, qualities and universals, identity, space, time, causation, and determinism. 3 units. *Sanford*

253. Philosophy of Mind. An analysis of mental concepts such as thought, belief; and such issues as mind-body relations, thought and action; the nature of persons and personal identity. 3 units. *Aquila and Coder*

260. Wittgenstein. An examination of the *Tractatus* or the *Investigations*. 3 units. *Welsh*

*Offered on demand.

287, 288. Foundations of Mathematics. See course description for Mathematics 287, 288. (Also listed as Mathematics 287, 288.) 3 units per semester. *Henson*

***291, 292. Critical Philosophy.** The analysis of basic philosophical concepts and beliefs with a view to critical evaluation and constructive emendation of them. Emphasis on the practice as well as the principles of philosophical criticism and problem-solving. Prerequisite: permission of the department; 291 is ordinarily prerequisite for 292. 3 units each semester. *Graduate Staff*

For Graduates

331, 332. Seminar in Special Fields of Philosophy. 3 units. *Graduate Staff*

Physical Therapy

Professor Jacobs, *Chairman and Director of Graduate Studies* (045 Hospital); Assistant Professors Villanueva and Mathews

The Department of Physical Therapy offers a graduate program leading to the M.S. degree. Before undertaking graduate work in physical therapy a student should have a background in the basic sciences and social sciences including course work in biology, chemistry, physics, psychology, and mathematics. As part of the prescribed curriculum of the first year students are required to take Anatomy 300 and Physiology 200. Further information may be obtained from the Director of Graduate Studies, Department of Physical Therapy, Box 3247, Duke University Medical Center.

201, 202. Seminar in Physical Therapy. Historical background and trends in the profession; orientation to physical therapy departmental organization and administration; professional and community relationships; professional ethics; methods of communication; and literature review. Units by arrangement. *Jacobs and Staff*

217. Physical Therapy Dynamics I. Orientation to patient care; principles of biomechanics; developmental patterns of movement and posture; theory and practice of selected therapeutic methods. 3 to 4 units. *Villanueva and Staff*

218. Physical Therapy Dynamics II. Regional approach to functional anatomy; principles and practice of physical therapy; biophysical and physiological considerations for utilization of selected therapeutic agents (mechanical, thermal, chemical, and electrical), with emphasis on methods of neuromuscular re-education. 5 units. *Villanueva and Staff*

220. Physical Therapy Dynamics III. Principles and practice of physical therapy; principles of prevention of deformity and disability; methods of facilitation of functional capacity; use of orthotic and prosthetic devices; synthesis of theory and practice in planning effective treatment programs. 2 to 4 units. *Villanueva and Staff*

*Offered on demand.

230. Physical Evaluation and Instrumentation. Principles and techniques of objective assessment and analysis of functional status as performed by the physical therapist including manual muscle tests, goniometry, electrical diagnostic testing, posture analysis, body measurements, evaluation of respiratory and sensory function, checkouts for prosthetic devices, disability evaluation, prevocational testing, and orientation to electromyography and dynamometry. 3 units. *Jacobs and Staff*

234. Introductory Pathology. Fundamentals of pathology, with emphasis on broad concepts of disease processes; systems of the body are studied from the point of view of histological and functional change. 3 units. *Jacobs and Special Lecturers*

236. Medical Sciences. Lectures by clinicians with patient demonstrations and correlation of treatment methods; medical and surgical, neurological, orthopaedic, and emotional conditions affecting human dysfunction; emphasis on psychodynamic principles of patient-therapist relationships. 4 units. *Jacobs, Staff, and Special Lecturers*

***238. Introduction to Health Service Systems.** Political, economic, and sociocultural aspects of the organization of health care systems; structural components and interrelationships; criteria for assessing and analyzing health care systems. 2 to 3 units. *Mathews*

242. Directed Clinical Experience in Physical Therapy I. Students are assigned to hospitals, rehabilitation centers, schools for crippled children, extended-care facilities, and public health units for short-term supervised learning experiences. 1 to 2 units. *Villanueva and Staff*

243. Directed Clinical Experience in Physical Therapy II. Students are assigned to full-time learning experiences under direction. 2 to 4 units. *Villanueva and Staff*

301. Introduction to Scientific Inquiry. Theory and use of analytical methods of problem-solving; elements of scientific writing; preparation of a research protocol and a major paper. 3 units. *Mathews*

***315. Curriculum Development.** Introduction to learning theory; development of objectives, organization, course content and evaluation in physical therapy education. 2 to 3 units. *Staff*

316. Directed Teaching in Physical Therapy. 1 to 3 units. *Staff*

***320. Sensorimotor Mechanisms Related to Rehabilitation.** Development of normal motor behavior, and structural and functional organization of the nervous system related to methods of facilitating functional capacities for performing the activities of daily living. 2 to 3 units. *Jacobs and Villanueva*

***322. Case Conferences in Rehabilitation.** Observation and demonstration of care of patients with extensive disability; emphasis on integration of health services for comprehensive care via the case conference approach. 1 to 2 units. *Staff*

*Offered on demand.

332. Administration of Physical Therapy Services. Principles of administration, leadership styles, and management roles; concepts of systems theory and analysis; planning, organizing, delivering, and evaluating physical therapy systems and subsystems. 3 units. *Mathews*

341-342. Advanced Seminar—Selected Problems. 2 to 3 units. *Staff*

350. Research. Units by arrangement. *Staff*

Physics

Professor Fairbank, *Chairman* (119 Physics Building); Associate Professor Evans, *Director of Graduate Studies* (213 Physics Building); Professors Biedenharn, Bilpuch, Gordy, Grueling, Lewis, Meyer, Newsome, Robinson, and Walker; Adjunct Professors Robl and Way; Associate Professors Cusson, Fortney, Roberson, and Walter; Assistant Professors Carpenter, DeLucia, Dzubay, Han, Riedel, Rose, and Sykes

The Department of Physics offers graduate work for students wishing to earn the A.M. or Ph.D. degree. In addition to a balanced program of basic graduate courses, the department offers specialized courses and seminars in several fields of high current interest, in which research is being done by students, faculty, and staff.

With the help of faculty advisers, each student selects a course program to fit his needs, including work in a minor field, usually mathematics or chemistry. Students are encouraged to begin research work early in their career.

The department does not ordinarily accept students for work toward the A.M. degree only, and students making good progress are advised to work directly for the Ph.D. The option of taking the A.M. without thesis is available, with the approval of a departmental committee.

A reading knowledge of one language, usually chosen from French, German, or Russian, is required for the Ph.D. degree.

For Seniors and Graduates

***209. Introduction to Solid State Physics.** Description of basic physical processes in solids with emphasis on dielectrics, metals, and semiconductors. Introduction to crystal structure and thermal and magnetic properties. 3 units.

212. Phase Transitions and Critical Phenomena. Description of phase transitions in diverse physical systems like fluids, magnets, mixtures, and superfluids. Experimental techniques and results. Application of the classical methods of thermodynamics, correlation functions, and mean field theory to the critical state of matter. Microscopic models of phase transitions. Modern approaches to static and dynamic critical phenomena such as the theories of critical exponents, scaling, series expansions, critical relaxation, and mode-mode coupling. 3 units. *Riedel*

215. Introduction to Quantum Mechanics. Wave mechanics and elementary applications; the hydrogen-like atoms; electron spin and angular momentum;

*Offered on demand.

operators and eigenvalues; stationary state perturbation theory; identical particles. Prerequisites: Physics 162, 182 or equivalents; Mathematics 285-286 may be taken concurrently. 3 units.

217, 218. Advanced Physics Laboratory and Seminar. Measurements involving the fields of mechanics, electricity, magnetism, heat, sound, optics, and modern physics. 3 units per semester. *Meyer*

220. Advanced Electronics. Vacuum tubes and solid state devices, advanced circuit analysis. 3 units. *Roberson*

***221, 222. Theoretical Physics.** Mechanics of particles and of rigid bodies, elasticity, fluids dynamics, electrodynamics; optics, relativity, thermodynamics, statistical mechanics, wave mechanics. Prerequisite: Mathematics 285-286, or equivalent, which may be taken concurrently. 3 units per semester.

223, 224. Electricity and Magnetism. Electrostatics, magnetostatics, and potential theory; dielectric and magnetic media; magnetic field of currents and the law of induction. Maxwell's electrodynamics. 3 units per semester. *Carpenter*

For Graduates

302. Advanced Mechanics. The fundamental principles of Newtonian mechanics; general dynamics of systems of particles and rigid bodies; the methods of Lagrange and Hamilton; generalized mechanics. 3 units. *Fortney*

303. Statistical Mechanics. Fundamental laws of thermodynamics and statistical mechanics with applications to physics and chemistry. Classical and quantum ideal gases; approximate methods for real gases and liquids. Prerequisite: Physics 215. 3 units. *Sykes*

***304. Advanced Topics in Statistical Mechanics.** This course will vary from year to year. Possible topics include Fermi liquids, systems of bosons, many-body theory, non-equilibrium statistical mechanics. Prerequisite: Physics 303 and 316. 3 units. *Sykes*

305. Introduction to Nuclear Physics. Phenomenological aspects of nuclear physics; interaction of gamma radiation and charged particles with matter; nuclear detectors; particle accelerators; radioactivity; basic properties of nuclei; nuclear systematics; nuclear reactions, particle scattering; nuclear models the deuteron; nuclear forces; parity. 3 units. *Roberson*

***306. Low Temperature Physics.** The properties of matter near the absolute zero of temperature; superconductivity, liquid helium, adiabatic demagnetization. Prerequisite: Physics 303. 3 units. *Fairbank*

308. Introduction to High Energy Physics. Cosmic rays; mechanisms of energy loss by very high energy particles; accelerators; present status of strong and weak interactions; parity; charge conjugation violation. 3 units. *Walker*

309. Introductory Solid State Physics. Properties of matter in the condensed state; crystal lattices, electrons in metals and semiconductors, band theory,

*Offered on demand.

non-metallic solids, lattice dynamics and phonons. Prerequisite: Physics 215 and 303. 3 units. *Riedel*

***310. Advanced Solid State Physics.** Elementary excitations and their interactions in the condensed state of matter; scattering theory and correlation functions; magnetic interactions in solids, superconductivity; amorphous solids. Prerequisites: Physics 309 and 316. 3 units. *Riedel*

316. Principles of Quantum Theory. Original and fundamental concepts of quantum theory; wave and matrix mechanics; theory of measurements; exclusion principle and electronic spin. Prerequisite: Physics 302. 3 units. *Biedenharn*

317. Intermediate Quantum Theory. General operator methods; angular momentum; Dirac electron theory. Second quantization; symmetry principles and conservation theorems. Applications to the theory of solids, of nuclei, and of elementary particles will be stressed. Prerequisite: Physics 316. 3 units. *Biedenharn*

318, 319. Electromagnetic Field Theory. Electrodynamics; theory of wave optics; radiation of electric and magnetic multipole fields; special relativity; covariant electrodynamics; Lienard-Wiechert potentials; scattering and dispersion; Hamiltonian field equations. Prerequisite: Physics 223. 3 units per semester. *Greuling*

***330. Nuclear Structure Theory.** Two body nuclear forces used to describe nuclear structure; nuclear shell and collective models; properties of nuclear levels; magnetic and quadrupole moments; transition probabilities; nucleon-nucleon scattering; nuclear reactions. Prerequisites: Physics 305 and 316. 3 units.

***331. Microwave Radiation.** Microwave generators, cavity resonators, transmission lines, radiation propagation, and detection. 3 units. *Gordy*

***335. Microwave Spectroscopy.** Application of microwaves in the determination of molecular, atomic, and nuclear properties. Stark and Zeeman effects in microwave spectroscopy. Magnetic resonance absorption. 3 units. *Gordy*

***341. Advanced Topics in Quantum Theory.** Introduction to relativistic quantum field theory; Lorentz and Poincare groups; quantization of free fields; interacting fields and S-matrix; applications to quantum electrodynamics and dispersion relations. Prerequisite: Physics 317. 3 units. *Han*

***342. Theory of Elementary Particles.** Theoretical methods used in treating particle interactions, emphasizing phenomenological treatments. Quantum field theory and dispersion theory is developed as needed. Applications in the general areas of pion physics, electromagnetic interactions of hadrons, strange particle interactions, and weak interactions are surveyed. Prerequisite: Physics 316. 3 units. *Evans*

***343. Nuclear Physics.** Elementary theory of the deuteron; low energy neutron-proton scattering; theory of nuclear reactions; penetration of potential barriers; nuclear energy levels. Prerequisite: Physics 215. 3 units. *Newson*

***344. Advanced Nuclear Physics.** The deuteron, nuclear forces, scattering

*Offered on demand.

of elementary particles, beta-radiation. Other aspects of nuclear physics susceptible of theoretical interpretation. 3 units. *Biedenharn*

***345. High Energy Physics.** Experimental and theoretical aspects of high energy nuclear processes; properties of mesons and hyperons. 3 units.

***346. Topics in Theoretical Physics.** The content of this course will vary from year to year. General methods in quantum mechanics such as: group theory and its applications; elementary particle theory; field theory; theory of solids; theoretical nuclear physics; atomic and molecular structure. Prerequisites: Physics 316, 317. 3 units.

351-352. Seminar. A series of weekly discussions on topics related to the research projects under investigation in the department. 2-4 units. *Graduate Staff*

397, 398. Low Temperature and Solid State Seminar. Weekly seminar on advanced topics and recent research work in the field of low temperature and solid state physics. 2-4 units. *Riedel and Sykes*

Physiology and Pharmacology

Professor Tosteson, *Chairman* (388 Medical Sciences I); Associate Professor Padilla, *Director of Graduate Studies* (340 Medical Sciences I); Professors Bernheim, Blum, Hitchings, Jobsis, Johnson, Lack, Maxwell, Moore, Narahashi, Nichol, Renkin, and Somjen; Associate Professors Fellows, Kylstra, Lauf, McManus, Ottolenghi, Posner, Salzano, Schanberg, and Wolbarsht; Assistant Professors Anderson, Baril, Elford, Greenfield, Gunn, Gutknecht, Kirk, Lieberman, Mendell, Mills, Palmer, Schomberg, Schooler, Slotkin, and Wachtel; Visiting Professor Schoeffeniels

In the Department of Physiology and Pharmacology graduate work is offered leading to the A.M. and Ph.D. degrees. Before undertaking graduate work in physiology or pharmacology a student should have a strong background in basic science including course work in mathematics, chemistry, physics, and biology. Students are accepted for graduate work who have undergraduate majors in any of the following areas: biology, chemistry, physics, or engineering. A brochure is available from the department which describes the program of study, financial assistance, facilities, and the research activities of the staff.

For Seniors and Graduates

200. Physiology of Man. An introduction to the basic concepts of physiology with particular reference to man. Three lectures, one laboratory, and one conference per week. Fall term. 6 units. *Graduate Staff*

201. Pharmacology: Mode of Action of Drugs. Studies and discussion of the pharmacological action of drugs in terms of biochemical and physiological processes. Three lectures and one conference per week. Prerequisite: Physiology 200 or equivalent. 4 units. *Graduate Staff*

208. Respiratory System in Health and Disease. Primary emphasis is on

*Offered on demand.

various aspects of the physiology of respiration. Topics covered include pulmonary mechanics, central and peripheral regulation of ventilation, pulmonary circulation, and respiratory responses to exercise, altitude, and hyperbaric environments. 2 units. *Salzano, Kylstra, and Saltzman*

209. Neuronal Physiology and Pharmacology. Structure and function of excitable membranes; impulse generation and conduction in different kinds of nerves; effects of pharmacological agents on electrical properties; physiological and pharmacological aspects of synaptic and neuromuscular transmission; biophysics of receptor cells. 3 units. *Narahashi and Staff*

210, 211. Individual Study and Research. Directed reading and research in physiology and pharmacology. Prerequisites: senior standing and permission of the Director of Graduate Studies. 3 to 9 units per semester. *Staff*

212. Marine Membrane Physiology. Physiology of marine and estuarine organisms, with emphasis on cellular transport and electrophysiological processes. The course will include laboratory work on the functions, mechanisms, and comparative aspects of ionic and osmotic regulation in marine plants and animals. (Also listed as Zoology 212.) (Given at Beaufort.) Prerequisite: permission of instructor. 6 units. *Gutknecht, Schoffeniels, Wachtel, and Staff*

213. Cellular and Chemical Pharmacology. Chemical aspects of cell-drug interaction and structure-activity relationships. Cholinergic mechanisms—pharmacological, and applied aspects. Biogenic amines—pharmacological and behavioral aspects. Psychoactive drugs and pharmacology of excitable tissues. Offered in alternate years beginning fall 1972. 3 units. *Ottolenghi and Staff*

215. Topics in Developmental Physiology and Pharmacology. An analysis of physiological basis of development at the organ level of organization with special reference to vertebrates. Topics will include development of neuronal connections, cardiogenesis, hormonal regulation, and pharmacological interactions in organogenesis. Prerequisite: permission of the instructor. 2 units. *Lieberman, Mendell, and Padilla*

216. Contractile Processes in Physiology and Pharmacology. Cellular basis of activity in cilia and skeletal, cardiac, and smooth muscle; submicroscopic structure of muscle; electrical and ionic properties of muscle membranes; the problem of electro-mechanical coupling; mechanics and thermodynamics of muscular contraction; biochemical energies of contraction. Prerequisite: permission of instructor. (Alternate years beginning spring 1972.) 3 units. *Anderson, Jobsis, and Johnson*

217. Membrane Transport Processes in Physiology and Pharmacology. Chemical composition and ultrastructure of biological membranes, ionic and osmotic equilibria across the membranes of individual cells, passive and active ionic transport, the role of ATPase, carrier-mediated diffusion of non-electrolytes, integration of transport processes to produce molecular movements across organized epithelia (e.g., amphibian skin and bladder and gastrointestinal mucosa). Prerequisite: permission of instructor. 3 units. *Gunn, Gutknecht, Kirk, Lauf, McManus, and Tosteson*

230. Molecular and Cellular Basis of Development. See course description for Anatomy 219. (Also listed as Anatomy 219, Biochemistry 219, and Pathology 219.) *Padilla, Counce, McCarty, and Staff*

230S. Optional seminar offered in conjunction with Physiology 230.

279. Student Tutorial in Physiology and Pharmacology. An introduction to critical reading of selected papers in physiology or pharmacology. Required of all first-year graduate students. 2 units. *Graduate Staff*

280. Student Seminar in Physiology and Pharmacology. Readings and discussions in depth of several aspects of physiology and pharmacology. Required of all second-year graduate students. 2 units. *Graduate Staff*

For Graduates

330. Pharmacological Basis of Clinical Medicine. This course consists of a detailed analysis of the mechanism of action and rationale for use of pharmacologic agents in disease states. 4 units. *Schanberg and Staff*

331. Laboratory Methods in Pharmacology. Tutorial laboratory training will be given in various fields of pharmacology including neuropharmacology, cardiovascular pharmacology, biochemical pharmacology, and biophysical pharmacology. Certain special laboratory sessions will be conducted at the Wellcome Research Laboratories, Research Triangle Park. Prerequisite: permission of instructor. 3-6 units. *Narahashi, Maxwell, and Staff*

342. Current Topics in Cardiac Muscle Physiology. Selected topics in the physiology and pharmacology of cardiac muscle, including general and comparative morphology and ultrastructure of cardiac electrophysiology and mechanics, excitation-contraction coupling. 2 units. *Johnson and Staff*

372. Research in Physiology and Pharmacology. Laboratory investigation in various areas of physiology and pharmacology. Credits to be arranged. *Staff*

393. Integrative and Clinical Neurophysiology and Neuropharmacology. Aspects of the physiology and pharmacology of the central nervous system in health and in disease: sensory coding; reflex functions; motor control; effects of drugs on the CNS; physiological aspects of memory. 3 units. *Somjen and Staff*

395. Biochemical Pharmacology. Emphasis on mechanism of action of drugs in the areas of (1) metabolism and toxicology; (2) antibiotics; (3) steroids; (4) antimetabolites; (5) embryology and development; (6) hematopoietic system and porphyrins; (7) lipids and carbohydrates; (8) membrane structure and functions; and (9) ground substance (mesenchyme). Lectures will be selected from the above areas and will correlate the material in terms of clinical significance. (Offered in alternate years beginning fall 1973.) (Also listed as Biochemistry 395.) 2 units. *Appel, Elford, Elion, Hitchings, Kamin, Kirschner, Lack, Nichol, Palmer, Posner, Rosse, and Welch*

401. Metabolic and Developmental Physiology and Pharmacology. Cell division and control of the cell cycle; population dynamics; physiology of subcellular organelles such as nuclei, mitochondria, lysosomes, and peroxisomes; me-

tabolic regulation with respect to temperature adaptation and to variations in exogenous substrates; control of development and differentiation in eucaryotic cells. Prerequisite: Biochemistry 247 or equivalent. 3 units. *Blum, Padilla, and Staff*

403. Endocrinology and Reproduction. See course description for Anatomy 403. (Also listed as Anatomy 403.) 3 units. *Anderson, Everett, and Fellows*

412. Advanced Seminar in Endocrinology and Reproductive Physiology I. A weekly seminar based on student and faculty-led discussions of special topics in endocrinology and reproduction. Primarily designed for advanced students with active research interests relating to these areas of mammalian physiology. Prerequisites: Physiology 403 or equivalent and consent of instructor. 2 units. *Fellows, Anderson, Schomberg, Everett, and Staff*

413. Advanced Seminar in Endocrinology and Reproductive Physiology II. A continuation of Physiology 412 with discussion of topics not covered in the fall term. Prerequisites: Physiology 412 and consent of instructor. 2 units. *Fellows, Anderson, Schomberg, Everett, and Staff*

414. Analysis of Physiological Systems. Several physiological systems will be analyzed in detail using a combination of classical mathematical analysis, model-building, and newer analog and digital techniques. Topics to be covered include diffusion processes and steady state and transient and cable equations. (Offered in spring 1974.) Prerequisite: permission of instructor. 3 units. *Moore and Blum*

415. Physiological Instrumentation. Electronic methods of measurement of physiological variables. The operational amplifier is used as the active building block in appropriate feedback circuits containing only passive elements to make a wide range of linear instruments including analog computers. Digital logic and computing elements are also developed. (Alternate years beginning spring 1972.) Prerequisite: permission of instructor. 3 units. *Moore and Staff*

420. Cellular Immunophysiology. This course will discuss the components of the erythrocyte membrane—protein, lipids, and carbohydrates, as they are known to participate in the formation of a membrane matrix capable of important functions such as transport of small molecules. Within the framework of this course it will be possible to show how immunologically active macromolecules affect physiological functions. (Also listed as Microbiology 420.) 2 units. *Lauf and Staff*

Political Science

Professor Braibanti, *Acting Chairman* (215 Perkins Library); Associate Professor Fish, *Director of Graduate Studies* (308 Perkins Library); Professors Ball, Cleveland, Cole, Cook, Grzybowski, Hall, Hallowell, Kornberg, Leach, and Simpson; Associate Professors Fish and Johns; Assistant Professors Eldridge, Paletz, Spragens, Trilling, and Valenzuela

The Department of Political Science offers graduate work leading to the A.M. and Ph.D. degrees. Before being admitted to candidacy for the Ph.D. degree, an applicant is normally expected to have qualified for the A.M. degree.

Instruction is designed to prepare the student for teaching and research, for government service, and for other work related to public affairs. Before undertaking graduate study in political science, a student is ordinarily expected to have completed at least 12 semester hours of course work in political science, including some work in American government.

Fields in which instruction is at present offered are American government and politics (including constitutional law, public administration, the legislative and judicial processes, and state and local government); comparative government and politics (including Western Europe, Southern Asia, Latin America, Africa, the Soviet Union, and the Commonwealth); political theory; international relations (including international law and international organization); and empirical theory and methodology.

The candidates for the master's degree are required to show proficiency in one modern foreign language and to submit either a thesis or thesis equivalent. The latter option is open only to students going on for the Ph.D. The thesis equivalent is defined as a major research paper substituted for the thesis on recommendation of the student's supervisor and with the approval of the Director of Graduate Studies.

The candidate for the degree of Doctor of Philosophy in political science must elect four fields, at least three of which must be selected from the fields enumerated above and one of which must be in a related department. He must also demonstrate a reading knowledge of two foreign languages which have been approved by the professor who supervises his dissertation, or he must demonstrate proficiency in one such foreign language and in the use of statistics.

For Seniors and Graduates

207. American Constitutional Interpretation. Major constitutional issues approached through selected Supreme Court decisions illustrating the Court's role in the governing process. Prerequisite: Political Science 127 or its equivalent. 3 units. *Fish*

209. Problems in State Government and Politics. 3 units. *Leach*

210. The Politics of Education. The forces in local, state, and national politics which impinge on educational administration. 3 units. *Leach*

214. Comparative Administrative Law. Comparative analysis of the role of administrative law and administrative techniques in established and transitional constitutional systems. Emphasis on French, German, British, and American patterns. Control of legality and expediency of various types of judicial review will be discussed. 3 units. *Grzybowski*

220. Problems in International Politics. Among the topics considered are nuclear power, bipolarity and polycentrism, nationalism, national interests and ideology, the revolution of modernization, and regional integration. 3 units. *Kulski*

221. International Organization: The United Nations. A study of the structure and functioning of the United Nations organs and of related specialized agencies. 3 units. *Ball*

222. Empirical Theory. Emphasis is on the theoretical status of contemporary conceptual frameworks which often rely on or generate empirical research. Prerequisite: Political Science 233 or consent of instructor. 3 units. *Trilling*

223. Political Philosophy from Plato to Machiavelli. An intensive analysis of the political philosophies of Plato and Aristotle followed by a survey of medieval political thought and an analysis of the significance of Machiavelli. (Offered in alternate years.) 3 units. *Hallowell*

224. Modern Political Theory. An historical survey and philosophical analysis of political theory from the beginning of the seventeenth to the middle of the nineteenth century. Attention is given to the rise of liberalism, the Age of Enlightenment, the romantic and conservative reaction, idealism, and utilitarianism. 3 units. *Hallowell*

225. Comparative Government and Politics—Western Europe. Modern political institutions and processes in Western Europe. 3 units. *Cole*

226. Theories of International Relations. Interdependence of theory and research. 3 units. *Eldridge*

285. The Judicial Process. A study of judicial decision-making in the United States, with emphasis on the process of litigation, the recruitment of judges, the influences and limits on judicial decisions, and their impact within the political system. Prerequisites: Political Science 127 or 207 or their equivalents. 3 units. *Fish*

291. Problems of Urban Government. Analysis of problems in the structure and functions of urban governments in the United States. 3 units. *Leach*

293. Federalism. A study of both the theoretical and operational aspects of federalism, with particular emphasis on their application in the American governmental system. (Offered in alternate years.) 3 units. *Leach*

For Graduates

310. Seminar in State and Local Government. (Offered in alternate years.) Prerequisites: Political Science 209 or 291 or their equivalents. 3 units. *Leach*

312. Seminar in Constitutional Law. Prerequisite: Political Science 207 or the equivalent. 3 units. *Fish*

313. Education and Public Policy. Seminar in the relationship of educational administration to the public policy process. 3 units. *Leach and Pittillo*

321. Seminar in Political Theory. (Offered in alternate years.) Prerequisites: 6 units in Political Science 223, 224, 229, 231 or the equivalents. 3 units. *Hallowell*

325. Seminar in Comparative Government and Politics. (Offered in alternate years.) Prerequisites: 6 units in Political Science 225, 249, 250, 251, 253, 280 or the equivalents. 3 units. *Cole*

328. Seminar in International Law. Prerequisite: Political Science 227 or the equivalent. 3 units. *Grzybowski*

329. Seminar in International Regional Organization. (Offered in alternate years.) Prerequisite: Political Science 221 or the equivalent. 3 units. *Ball*

227. International Law. Elements of international law, particularly as interpreted and applied by the United States; rights and duties of states with respect to recognition, state territory and jurisdiction, nationality, diplomatic and consular relations, treaties, treatment of aliens, pacific settlement of disputes, international regulation of the use of force, and collective responsibility. 3 units. *Grzybowski*

229. Recent and Contemporary Political Theory. The rise of positivism and its impact upon modern political thought, the origins of socialism, Marxism and its variants, socialism in the Soviet Union, nationalism, Fascism and National Socialism, the crisis in modern democracy, Christianity, and the social order. 3 units. *Hallowell*

230. American National Government. A study of the formation, development, and contemporary operation of the national political system. The analysis employs both historical and behavioral approaches. 3 units. *Thomas*

231. American Political Theory. An analysis of the main currents in American political thought from colonial beginnings to the present day, with emphasis upon the development of liberalism in America. 3 units. *Leach*

233. Research Methodology. The research process in political science with emphasis on the construction and implementation of research designs. 3 units. *Trilling*

235. The Commonwealth. An analysis of the political relationship between the members of the Commonwealth and a comparative study of the political systems of the Commonwealth countries, with particular reference to Canada. A course designed in part to utilize the occasional services of visiting professors from Commonwealth countries. 3 units. *Cole*

236. Statistical Analysis. An introduction to the descriptive and analytical uses of statistics in political research. Prerequisite: graduate standing or permission of instructor. 3 units. *Trilling*

237. Problems in American Foreign Policy. The decision-making process as applied to contemporary foreign policy issues. (Offered in alternate years.) Prerequisite: Political Science 122 or the equivalent. 3 units. *Ball*

241. Public Administrative Organization and Management. An examination of the American administrative process, with emphasis upon the theory and practice of administrative organization and management. 3 units. *Hall*

243. Administrative and Organizational Theory and Behavior. A behavioral analysis of public bureaucracies in the United States. (Offered in alternate years.) 3 units. *Thomas*

244. Administrative Law and Process. The nature and law of the administrative process in the context of American government and politics, with special

attention to the powers, procedures, and judicial control of administrative agencies. 3 units. *Hall*

246. Administration and Public Policy. The role of the administrative official as a policy-maker in modern American politics. 3 units.

249. Comparative Political Analysis and Political Development. General methodology of comparison of political systems. Institutional, structural, functional, and configurative modes of analysis. Theory of political development. Theoretical problems of induced political change. 3 units. *Braibanti*

250. Comparative Government and Politics—Southern Asia. Political development of India and Pakistan. Contextual determinants of the political systems. Political consequences of partition. National integration, constitutional and institutional aspects of the political systems. Impact of foreign technical assistance. 3 units. *Braibanti*

253. Comparative Government and Politics: Latin America. Current literature applicable to an understanding of the major themes of Latin American politics. 3 units. *Valenzuela*

271. Political Processes in Traditional and Modern Africa. An analysis of patterns of change in selected African societies from the pre-colonial to the post-colonial period. The focus of the course will be upon the interaction between traditional, colonial, and post-colonial institutions and their impact upon African societies. (Also listed as History 219.) 3 units. *Johns*

275. The American Party System. An intensive examination of selected facets of American national political parties, such as relationships between presidential and congressional politics, the politics of national conventions, and the controversy over party government. 3 units. *Kornberg*

277. Comparative Party Politics. The impact of social and political systems on party structures, functions, ideologies, and leadership recruitment. Emphasis upon research techniques and objectives. 3 units. *Kornberg*

279. The Legislative Process. A behavioral analysis of the American legislative process with emphasis on Congress. Some consideration will also be given to legislatures in other countries. 3 units. *Paletz*

280. Comparative Government and Politics—Sub-Saharan Africa. Politics and government in selected African states, with particular attention to the problems of decolonization and modernization in the post-independence period. 3 units. *Johns*

330. Seminar in Comparative Government and Politics—Southern Asia. Emphasis on research using documentary materials relating to India, Pakistan, Ceylon, and Malaysia. Prerequisites: Political Science 250, 251, or the equivalents. (Offered in alternate years.) *Braibanti*

341. Seminar in Public Administration. Selected topics in administrative and organizational theory and behavior. Prerequisite: Political Science 141 or 243. 3 units. *Thomas*

342. Seminar in American National Government and Politics. Prerequisite: Political Science 230 or its equivalent. 3 units. *Thomas*

343. Seminar in the Policy Process. Selected topics covering the theory, methodology, and practice of policy formation in American politics. Prerequisite: Political Science 246 or its equivalent. 3 units. *Thomas*

344. Workshop on Computer Models of Social Systems. (Also listed as Economics 344.) 3 units. *Naylor*

360. Seminar in Government and Politics in the Soviet Union. Prerequisite: Political Science 165, or on individual approval. 3 units. *Kulski*

361. Seminar in Foreign Relations of the Soviet Union. Prerequisite: Political Science 220 or 360, or on individual approval. 3 units. *Kulski*

376. Seminar in Comparative Political Behavior. (Offered in alternate years.) Prerequisites: Political Science 275 or 277 or their equivalents, or by special approval of the instructor. 3 units. *Kornberg*

377. Seminar in Canadian Political Behavior. Analysis of institutional processes and political behavior in Canadian society with special reference to the impact of multi-partyism, parliamentarism, political, and cultural particularism, and the elite structure. (Offered in alternate years.) Prerequisite: Political Science 235 or 277, or by special approval of the instructor. 3 units. *Kornberg*

380. Seminar in African Government and Politics. Prerequisite: Political Science 280 or its equivalent. 3 units. *Johns*

381. Seminar in Latin American Government and Politics. Prerequisite: Political Science 253 or the equivalent. (Offered in alternate years.) 3 units. *Valenzuela*

401. Seminar in the Commonwealth. 3 units. *Braibanti, Cole, Preston, and Spengler*

402. Interdisciplinary Seminar in the History of the Social Sciences. A survey of the theories, methods, and tools applied to problems in the history of the social sciences. 3 units. *Goodwin, Holly, Spengler, Spragens, and Tiryakian*

Related Course Work in the School of Law

There may be graduate credit for course work completed in the Duke University School of Law, under regulations referred to on page 57 of this *Bulletin*.

Psychology

Professor Jones, *Chairman* (224 Psychology-Sociology Building); Associate Professor Staddon, *Director of Graduate Studies* (242 Psychology-Sociology Building); Professors Alexander, Borstelmann, Brehm, Carson, Diamond, Guttman, Lakin, Schiffman, and M. Wallach; Associate Professors C. Erickson, R. Erickson, Linder, Lockhead, and Wing; Associate Research Professor Gaffron; Assistant Professors Aderman, Coie, Costanzo, Hall, Kalat, Kramer, Kremen, Robinson, and

White; Lecturers Clifford, E. Crovitz, H. Crovitz, Eisdorfer, I. Gehman, Kinsbourne, Krugman, Obrist, Peele, Shows, Somjen, Thompson, L. Wallach, and Wolbarsht

The department offers work leading to the Ph.D. degree. The areas of concentration are experimental psychology, physiological and comparative psychology, social psychology, and personality-clinical psychology. Programs of study are typically arranged to provide needed background in psychology and related areas in the first year or two, with increasing specialization in course work and research in subsequent years. Early in the second year of residence, the Ph.D. student is expected to have planned his further program of specialized studies; by the end of the second year, or during the third year, when the preliminary examination is normally taken, the doctoral dissertation plan should be formulated. An original dissertation demonstrating independent research competence and scholarship is the most important formal requirement for the Ph.D. degree.

Students specializing in clinical psychology undertake field work in a variety of settings, and an integral part of this program is a one-year internship in an approved and appropriate institution. Clinical internship is arranged for the third year of study or a later year, depending on the student's progress and needs.

Related work in a variety of fields is available. The areas most relevant to graduate work in psychology are the biological sciences (zoology, neuroanatomy, physiology), mathematics and statistics, sociology and anthropology, and philosophy of science. Basic preparation in statistics and quantitative methods is normally obtained in the Department of Mathematics. Mastery of a foreign language is required only if necessary for the student's particular program.

Further details concerning the program of studies in psychology may be obtained from the Director of Graduate Studies in Psychology.

For Seniors and Graduates

203. Sensation and Perception. An examination of the classical concepts in sensation and perception and of the resulting psychophysical data for each of the major senses with emphasis on vision and audition. Modern perceptual formulations are discussed through analysis of the empirical evidence in support of each view. 3 units. *Lockhead*

204. Comparative Psychology. An analysis of the ontogeny, evolution, adaptive significance, and physiology of animal behavior. 3 units. *C. Erickson*

***210. Cognition and Higher Mental Processes.** An analysis of selected research in thinking, problem solving, creativity, language, and related topics. 3 units. *Staff*

211. The Problem Child. See course description for Education 211. (Also listed as Education 211.) 3 units. *I. Gehman*

213. Adaptive Behavior. The principles of adaptive behavior, with special emphasis on the effects of reinforcement. Prerequisite: consent of instructor. 3 units. *Staddon*

*Not offered in 1972-73.

215. Developmental Psychology. An examination of theoretical issues in identification, regression, and cognitive, moral, and motivational development. 3 units. *Kramer and Staff*

216. Biological Psychology. The methods of biology (as applied to psychology), especially in neurophysiology, neuroanatomy, and genetics. Topics covered include the genetics of behavior, the organization of the dorsal thalamus and neocortex, and the limbic system and hypothalamus. Methods covered include ablation method, method of evoked potentials, electrical stimulation of the brain, and classical and physiological genetics. 3 units. *Diamond*

217. Social Psychology. Social factors in cognition, models of social interaction, conformity and social influence, and attitude development and change. 3 units. *Jones*

219. Physiological Psychology I. The structure and function of the nervous system as related to problems of sensory-motor processes and learning. 3 units. *R. Erickson*

220. Physiological Psychology II. Examination of the role of nervous mechanisms and hormones in the control of goal-directed behavior and emotion. 3 units. *C. Erickson*

234. Seminar in Personality. A detailed consideration of selected research topics of current interest in the experimental study of personality, including risk-taking, creativity, and cognitive styles. 3 units. *Wallach*

236. Theoretical Psychology. Representative systematic formulations and schools in historical sequence. 3 units. *Guttman*

238. The Electroencephalogram and Psychological Function. A survey of experimental and clinical literature on brain wave correlates of intelligence, personality, behavior disorders, epilepsy, sleep, sensory stimulation, conditioning, and learning. Lectures, laboratory demonstrations, and clinical case presentations. 3 units. *Obrist*

239. Behavioral Correlates of Brain Damage in Man. A study of the effects of brain damage on psychological functioning. Known brain-behavior relationships in man will be reviewed, and problems encountered in the study of brain function in man will be emphasized. Laboratory demonstrations will be concerned with the assessment of cerebral dysfunction through the use of standard psychological tests. 3 units. *Thompson*

245. Personality Theory I. An examination of representative theories of human functioning from Freud through depth and neoanalytic approaches. 3 units. *Alexander and Kremen*

246. Personality Theory II. An examination of representative models of human functioning from among such approaches as that of field theory, behavior theory, type or trait theory, and ego psychology. 3 units. *Alexander, Kremen, and Schiffman*

253. Personality Development. A survey of behaviors and concepts relating

to personality functioning with special emphasis on infancy, childhood, and adolescence. 3 units. *Staff*

271.1-4. Seminar in Selected Problems. 3 units each. *Staff*

271.5 Comparative Neurology and Psychology. See course description for Anatomy 271. (Also listed as Anatomy 271.) 3 units. *Hall*

273. Principles of Psychological Measurement. Measurement theory and the problems of scientific inference. Topics will include methods of data analysis, psychometric scaling, and test construction. Prerequisite: Mathematics 232 or equivalent. 3 units per semester. *Schiffman*

282. Introduction to Methods in Psychotherapy. Current trends in psychotherapeutic practice and research. Emphasis is on the application of principles drawn from theories of personality to individual and group psychotherapy. Includes some field experience in therapy. 3 units. *Carson and Lakin*

291. Seminar in Community Mental Health. A study of psychological epidemiology and ecology; primary, secondary, and tertiary prevention; and the public health approach to problems of psychological well being. Focus on intervention techniques, such as consultation and community action planning. 3 units. *Altrocchi*

292. The History of Psychology. 3 units. *Guttman*

293. Methods in Developmental Psychology. Methodological and epistemological issues in research in development. Individual and group research projects are an integral part of the course. 3 units. *Staff*

For Graduates Only

303, 304. Research. Students who are properly qualified may carry on research work under direction. Hours and credits to be arranged. *Staff*

305. Psychopathology. An examination of behavior disorders, with particular emphasis on explanatory concepts and the evidence from research in this field. 3 units. *Staff*

306. Seminar in Developmental Psychology. Selected topics in cognitive, emotional and social development. 3 units. *Staff*

309. Seminar in Learning. Selected topics in operant conditioning and discrimination learning. 3 units. *Staddon*

310. Seminar in Perception. 3 units. *Lockhead*

313. Seminar on the Concept of the Reflex. A consideration of the reflexological principles found in the works of Sherrington, Sechenov, Pavlov, Eccles, Skinner, Konorski, *et al.*, and an examination of the critiques of Goldstein, Lashley, and others. 3 units. *Diamond and Guttman*

314. Seminar in Instrumental Behavior. 3 units.

316. Seminar in Social Psychology. 3 units.

317. Seminar in Social Behavior. 3 units. *Linder*

318. Seminar in Social Influence. 3 units. *Brehm*

319-320. Student-Faculty Research Conference. 3 units per semester. *Staff*

324. Seminar: Behavioral Studies of the Brain. Selected topics in the neural bases of behavior. 3 units. *Diamond and R. Erickson*

325. Seminar in Neuroendocrinology and Behavior. Selected problems in the study of hormones and neurohumors as they are related to such areas as reproductive behavior, sleep, and emotion. 3 units. *C. Erickson*

335-336. Clinical Psychology Practicum. Seminar discussion and supervised field experience in the application of basic psychological procedures and principles to clinical cases in a variety of institutional settings. Prerequisites: Psychology 245, 246, 347, and 348. 1 to 6 units per semester. *Staff*

337. Seminar in Sensory Discrimination. The neural bases of discrimination in vertebrates and invertebrates is studied by neurophysiological, electrophysiological, and psychophysical techniques. 3 units. *R. Erickson and Wolbarsht*

340. Group Processes and Sensitivity Training. 3 units. *Lakin*

343, 344. Advanced Seminar in Clinical Psychology. 1 to 3 units each semester. *Staff*

347-348. Personality Assessment. Introduction to the assessment of human personality through the study of personal documents, interview data, objective and projective test material. Laboratory sessions will be concerned with personality assessment of normal human subjects over extended time periods. 3 units per semester. *Alexander and Kremen*

Religion

Professor Poteat, *Chairman*; Professor Young, *Director of Graduate Studies* (209 Divinity School); Professors Baker, Beach, Bradley, Cushman, Davies, Henry, Herzog, Lacy, Langford, Murphy, Osborn, Petry, Price, and M. Smith; Associate Professors, Bailey, Clark, Kort, Meyers, Partin, Robinson, H. Smith, Steinmetz, and Wintermute; Assistant Professor Charlesworth

The Department of Religion offers graduate work leading to the A.M. and Ph.D. degrees. Students may major in one of three fields: (1) Biblical studies; (2) historical studies; and (3) systematic and contemporary studies. They will be expected to take such courses in one or both of the other fields as will conduce to an adequate understanding of their chosen fields of specialization.

In addition to course work in these major fields, students will take such other courses in cognate fields as will contribute to the enrichment of their major studies.

This minor requirement may be fulfilled either by work in a cognate department, such as Classical Studies, History, Political Science, or Sociology, or by work in a cognate field within the Department of Religion other than the field of major concentration.

The program of doctoral studies presumes a foundation in the academic study of religion. Students applying for graduate work in religion directly from an

undergraduate program should have had a strong undergraduate major in religion, and will be accepted for the Ph.D. program only upon the satisfactory completion of the A.M. degree with the department.

FIELD I. BIBLICAL STUDIES

207. Second Hebrew. Historical Hebrew grammar with reading and exegesis of Old Testament prose (the Pentateuch and historical books in alternate years). First semester. 3 units. *Staff*

208. Second Hebrew. Historical Hebrew grammar with reading and exegesis of Old Testament poetry (the Prophets and the Writings in alternate years). Second semester. 3 units. *Staff*

209. Biblical Theology. A study of the Old and New Testament in regard to their theological relationship. 3 units.

223A. Exegesis of the Hebrew Old Testament: Amos and Hosea. Interpretation based upon Hebrew exegesis, stress upon hermeneutical method. 3 units. *Bailey*

225. Living Issues in New Testament Theology. Critical examination of major problems and issues in New Testament interpretation and theology. 3 units. *M. Smith*

226.A Exegesis of the Greek New Testament I (Mark and Matthew). 3 units. *Price or Smith*

226B. Exegesis of the Greek New Testament I (Romans). 3 units. *Price*

227A. Exegesis of the Greek New Testament II (Luke-Acts.) 3 units. *Young*

227B. Exegesis of the Greek New Testament II (Galatians). 3-units. *Smith*

227C. Exegesis of the Greek New Testament II (The Pastoral Epistles). 3 units. *Young*

228. The Theology of the Gospel and Epistles of John. A study of the origin of these writings; the provenance of their thought forms and symbolism; their influence on the early church; and contemporary significance. 3 units. *Price*

258. Coptic. Introduction to the Sahadic dialect with selected readings from Christian and Gnostic texts. Prerequisite: at least one year of Greek. 3 units. *Wintermute*

302. Studies in the Intertestamental Literature. Selected documents of the Apocrypha and Pseudepigrapha examined exegetically and theologically in their relation to Post-Exilic Judaism. Prerequisite: permission of the instructor. 3 units. *Charlesworth*

304. Aramaic. A study of the Aramaic portions of the Old Testament and selected passages from the Targums, Midrashes, and Talmuds. 3 units. *Myers or Murphy*

305. Third Hebrew. An interpretative study of late Hebrew prose, with readings from Chronicles, Ecclesiastes, and the Mishnah. 3 units. *Davies or Myers*

306. Language and Literature of the Dead Sea Scrolls. A study in interpretation. Prerequisite: a knowledge of Hebrew. 3 units. *Charlesworth*

307. Syriac. A study of the script and grammar, with readings from the Syriac New Testament and other early Christian documents. Prerequisite: some knowledge of Hebrew and Aramaic. 3 units. *Charlesworth*

309. History of the Ancient Near East. A specialized study of the civilizations of Egypt, Palestine, Syria, and Mesopotamia in the light of Biblical archaeology. 3 units. *Bailey*

312. Pauline Theology. Studies in aspects of Paulinism in the light of recent scholarship. 3 units. *Davies*

314. Judaism and Christianity in the New Testament. Their interaction. 3 units. *Davies*

319. The Gospel According to St. Matthew in Recent Research. 3 units. *Davies*

340-341. Seminar in the New Testament. Research and discussion on a selected problem in the Biblical field. 2 or 3 units. *Price, Smith, and Young*

342. The Archaeology of Palestine in Hellenistic-Roman Times. The study of material and epigraphic remains as they relate to Judaism in Hellenistic-Roman times, with special emphasis on Jewish art. Prerequisite: reading knowledge of Hebrew, Aramaic, and Greek. 3 units. *Meyers*

345. The Epistle to the Hebrews in Recent Research. Intensive attention to the text and to secondary sources. 3 units. *Davies*

350-351. Old Testament Seminar. Research and discussion on selected problems in the Old Testament and related fields. 3 units per semester.

373-374. Elementary Akkadian. Study of the elements of Akkadian grammar. Reading of neo-Assyrian Texts shedding light on the Old Testament. Prerequisite: Biblical Hebrew. 6 units. *Bailey*

375-376. Elementary Ugaritic. Study of the elements of Ugaritic. Prerequisite: Biblical Hebrew. 6 units. *Bailey*

401-402. Colloquium in Biblical Studies. A colloquium in which all graduate faculty and students in the Biblical division participate. Research papers in the Biblical field are read and discussed.

FIELD II. HISTORICAL STUDIES

241. Problems in Reformation Theology. An historical inquiry into the nature of the sacraments and their relevance for the life of the church. 3 units. *Steinmetz*

251. The Counter-Reformation and the Development of Catholic Dogma.

An advanced survey of the main trends in Catholic theology from the death of Ockham to the Second Vatican Council. 3 units. *Steinmetz*

260. Seminar: Wesley Studies. The lives and thoughts of John and Charles Wesley and their colleagues in relation to English culture and religion in the eighteenth century. 3 units. *Baker*

280. The History of Religions. A study of the methodology of the history of religions, the nature of religious experience, and specific categories of religious phenomena. 3 units. *Partin*

283. Religions of East Asia. A study of the major traditions of China and Japan with emphasis on the development and expansion of Buddhism. 3 units.

284. The Religion and History of Islam. A study of the origins and development of the Islamic tradition and community, with particular attention to the religious element. 3 units. *Partin*

285. Origins of Indian Civilization. A study of the main sources and traditions of the classical civilization of the Indian subcontinent, with particular attention to religious movements and institutions. (Also listed at History 285.) 3 units.

289. World Religions and Social Change. The role of religious traditions and institutions in national and international affairs. Intensive study of selected areas of Asia and Africa, with special stress on missionary religions and political change. 3 units. *Bradley*

296. Religion on the American Frontier. A study of the spread of evangelical Christianity as a theological and cultural phenomenon of the American West. 3 units. *Henry*

308. Greek Patristic Texts. Critical translation and study of selected Greek texts illustrative of significant aspects of patristic theology and history from the second through the fifth century A.D. 3 units. *Young*

313. The Apostolic Fathers. A study of the religious thought in the writings of the Apostolic Fathers. 3 units. *Young*

315-316. Seminar: History of Religions. Selected problems in the field. 3 units.

317. Seminar in the Greek Apologists. A study of the apologetic writings of the Greek Fathers in relation to the challenges of their contemporary world. Special attention will be given to leading protagonists of late Graeco-Roman culture, such as Celsus, Porphyry, and Julian. 3 units. *Young*

318. Seminar in the Greek Fathers. A study of selected topics from the Greek Fathers. 3 units. *Young*

331. The Social Message of the Early and Medieval Church. A study of the social teachings and contributions of the Christian Church prior to the Protestant Reformation. 3 units. *Petry*

332. The Medieval Church. Outstanding characteristics of the medieval

Church, emphasizing theory, polity, institutions, sacraments, and worship. 3 units. *Petry*

334. Church Reformers and Christian Unity. The work of such reformers as Marsilius of Padua, William of Ockham, Jean Gerson, Pierre d'Ailly, and Nicholas of Cusa in relation to ecclesiastical schism and the search for Christian unity through representative councils. 3 units. *Petry*

335. The English Church in the Eighteenth Century. Studies of Christianity in England from the Act of Toleration, 1689, to the death of John Wesley, 1791. 3 units. *Baker*

336. Christian Mysticism in the Middle Ages. Source studies in historical perspective of such late medieval mystics as Bernard of Clairvaux, the Victorines, Ramon Lull, Meister Eckhart, Richard Rolle, Catherine of Siena, and Nicholas of Cusa. 3 units. *Petry*

338. Calvin and the Reformation in Switzerland. The theological development of John Calvin. A comprehensive examination of his mature position with constant reference to the theology of the other reformers. 3 units. *Steinmetz*

339. The Radical Reformation. Protestant movements of dissent in the sixteenth century. Special attention will be devoted to Müntzer, Carlstadt, Hubmaier, Schwenckfeld, Denck, Marpeck, Socinus, and Menno Simons. 3 units. *Steinmetz*

391. Historical Types of Christian Ethics I. A critical study of representative statements of Christian ethical theory, through the early Reformation. 3 units. *Beach*

392. Historical Types of Christian Ethics II. A continuation of Religion 391, from the Reformation through current Christian ethical theory. Prerequisite: Religion 391. 3 units. *Beach*

395. Christian Thought in Colonial America. Exposition of the main currents in Protestant theology. 3 units. *Henry*

396. Liberal Traditions in American Theology. A study of the main types of modern religious thought, beginning with the theology of the Enlightenment. 3 units. *Henry*

FIELD III. SYSTEMATIC AND CONTEMPORARY STUDIES

210. Contemporary British Theology. A study of twentieth-century British theology. Attention will be given to the Anglican, Free Church, and Scottish traditions. 3 units. *Langford*

211. Authority in Theology. The idea and function of authority in theology. 3 units. *Langford*

230. The Meaning of Religious Language. An analysis of the credentials of some typical claims of theism in the light of theories of meaning in recent thought. (Also listed as Philosophy 230.) 3 units. *Poteat*

231. Seminar in Christianity and Contemporary Thought. Analytical read-

ing and discussion of such critical cultural analysis as is found in the works of M. Polanyi, Arendt, Trilling, and others, with appraisal of the relevance for theological inquiry. 3 units. *Poteat*

232. Religion and Literature: Perspectives and Methods. A study of literary works and their religious origins, parallels, and implications as analyzed and interpreted by myth or archetype critics and by theological critics. 3 units. *Kort*

223. Modern Narrative and Religious Language. A study of the fiction of selected American, British, and Continental writers of the first half of the twentieth century, with special attention to the role of religious language in their work. 3 units. *Kort*

248. The Theology of Karl Barth. An historical and critical study of the theology of Karl Barth. Prerequisite: permission of the instructor. 3 units. *Osborn*

249. The Church in Contemporary Theology. A critical and systematic study of the doctrine of the Church in contemporary Christian thought. 3 units. *Osborn*

281. Phenomenology and Religion. Scheler, E. Strauss, Merleau-Ponty, Ricoeur, Binswanger, or others to show their bearing upon religious knowledge and practice. Prerequisite: permission of the instructor. 3 units. *Poteat*

292. Christian Ethics and International Relations. An examination of Christian attitudes toward such issues as war and peace, the rule of law, foreign aid, and human rights; and the Church's contribution to international policies and institutions. 3 units. *Lacy*

293. Sociological Analysis of Religion. An analysis of the way in which various components of a religion (belief-systems, liturgical practices, ethical teachings, institutional structure, and modes of operation) function in relation to social cohesion, social conflict, and social reform. 3 units. *Clark*

294. Institutional Analysis of Religious Bodies. A study of the internal structure and dynamics of religious groups. 3 units. *Clark*

295. Ethics and Economic Life. A survey of the historical teachings of the Christian churches in the areas of economic life, an analysis of contemporary norms of economic justice, and an exploration of current public and private economic policies and the policy-making processes. 3 units. *Clark*

300. Systematic Theology. Method and structure of systematic theology, the doctrine of God, theological anthropology, and Christology. 3 units. *Herzog*

303. The New Hermeneutic and the Concept of History. A critical examination of key issues in present-day European systematic theology centered in the positions of Fuchs, Ebeling, Moltmann, Ott, and Pannenberg. 3 units. *Herzog*

320. Hegel and Schleiermacher. A study of two makers of modern Protestant thought. 3 units. *Herzog*

322. Nineteenth-Century European Theology. Protestant theology from Kant to Herrman. 3 units. *Herzog*

325. Philosophical Theology I. Main problems in the history of philosophical theology from the pre-Socratics to Descartes. 3 units. *Cushman and Robinson*

326. Philosophical Theology II. Main problems of philosophical theology in the modern period. 3 units. *Cushman and Robinson*

328. Twentieth-Century European Theology. Critical examination of the thought of selected representative theologians. 3 units. *Herzog*

333. Seminar: Marxist Ideology and Christian Faith. Comparative study of Communist and Christian doctrines of man, society, sin, history, ethics, and eschatology. 3 units. *Lacy*

380. Existentialist Thought. An exploration of the interests and motifs of Existentialism in relation to modern philosophy and theology through an analysis of representative writings of Kierkegaard, Heidegger, Berdyaev, Marcel, and Sartre. 3 units. *Poteat*

383. Moral Theology in the Twentieth Century. Critical and comparative examination of ethical theory as exhibited in the work of selected contemporary theologians. 3 units. *H. Smith*

384. Religious Dissent in American Culture. History and significance of dissent in the theology and culture of America. 3 units. *Henry*

385. Religion in American Literature. A critical study of the meaning and value of religious motifs reflected in American literature. 3 units. *Henry*

386. Christianity in Dialogue with Other Faiths. Contemporary currents of Christian thought as they affect resurgent non-Christian faiths, new formulations of a theology of mission, and ecumenical conversations. 3 units. *Lacy*

388. Ethics and Medicine. A critical study of selected aspects of modern biomedical technology, with special reference to the ethical assumptions informing their development and practice. 3 units. *H. Smith*

389. Christian Ethics and Contemporary Culture. A study of the interaction between Christian thought and current social theory. 3 units. *Beach*

390. Current Problems in Christian Ethical Theory. A critical study of dominant issues in Christian ethics, through an analysis of a variety of contemporary Christian treatments of such problems as love, justice, conscience, and vocation. 3 units. *Beach*

394. Christianity and the State. The relation of the Christian theory of the State to political problems, with special consideration of the religious assumptions underlying democratic theory and practice and of the relationship of church to state. 3 units. *Beach*

397. Contemporary American Theology. A critical appraisal of major tendencies. 3 units. *Henry*

398. Colloquium on the College and University Teaching of Religion. The theological issues of religion in higher education; a consideration of the cur-

ricular content of religion courses. Normally expected of Level III students in Fields I, II, and III in residence. *Young and Staff*

Romance Languages

Professor Fein, *Chairman* (205 Foreign Languages); Associate Professor Vincent, *Director of Graduate Studies* (214 Foreign Languages); Professors Cordle, Davis, Fowlie, Predmore, Tétel, and Wardropper; Visiting Professor Niess; Associate Professor Hull; Assistant Professors Auld and Caserta

The Department of Romance Languages offers graduate work leading to the A.M., M.A.T., and Ph.D. degrees in French and Spanish. Requirements for the A.M. may be completed by submission of a thesis or by passing a comprehensive examination in the major field. It is hoped that candidates for the A.M. and Ph.D. will minor in a second Romance language; however, minor work may be taken in any one or two of a number of other subject areas.

In order to undertake graduate study in Romance languages, the entering student should have credit for at least 18 semester hours or (equivalent) above the intermediate level in the major language.

FRENCH

For Seniors and Graduates

209. Advanced Composition and Syntax. A systematic study of the differences between French and English patterns of expression; practice in writing various styles of French. 3 units. *Hull*

210. The Structure of French. Modern French phonology, morphology, and syntax. Readings in current linguistic theory. 3 units. *Hull*

213, 214. French Literature of the Seventeenth Century. First semester: theatre. Readings in the dramatic literature of the century. Second semester: prose and non-dramatic poetry. Readings in baroque and *précieux* poetry, the novel and the *moralistes*. 3 units per semester. *Auld*

217. Mallarmé and Rimbaud. The symbolism and the formal elements in Mallarmé's poetry. The poetic theory and the psychic elements in Rimbaud's poetry. 3 units. *Fowlie*

219. Old French Literature. An introduction to the reading of Old French literary texts. 3 units. *Vincent*

221, 222. The Nineteenth-Century French Novel. First semester: the Romantic hero in conflict with society, with special emphasis on the works of Stendhal and Balzac. Second semester: the decline of the individual hero. Flaubert and Zola will receive intensive study. 3 units per semester. *Staff*

223. French Literary Criticism. A history of critical theory in France and a study of the major critics from the Renaissance to today. 3 units. *Fowlie*

224. History of the French Language. The evolution of French from Latin to its present form; internal developments and external influences. 3 units. *Hull*

225, 226. From Renaissance to Baroque in French Literature of the Sixteenth Century. First semester: literary prose. Readings from Jean Lemaire de Belges, Marguerite de Navarre, Rabelais, Montaigne, and others. Second semester: poetry and theater. Readings from Marot, Scève, Labé, Saint Gelais, the Pléiade, d'Aubigné, Sponde, Du Bartas, Garnier, and others. 3 units per semester. *Tétel*

228. French Poetry of the Twentieth Century. In the wake of symbolism; Valéry and Claudel; poetry as ritual, Péguy; Apollinaire and surrealist poetry; the contemporary movement, Michaux, Char, Saint-John Perse. 3 units. *Fowlie*

233. Contemporary French Theater. A study of dramatic theory; the art of the leading directors; and the major texts of Claudel, Giraudoux, Anouilh, Sartre, Beckett, Ionesco, and Genet. 3 units. *Fowlie*

234. Proust. A study of *A la recherche du temps perdu*. The thematic structure and the aesthetics of the work. 3 units. *Fowlie*

236. Baudelaire. A study of the poetry and the criticism of Baudelaire as contributing to the origins of modern art and literature. 3 units. *Fowlie*

241, 242. French Literature and Thought in the Age of Enlightenment. First semester: the new philosophy and its propagation. Second semester: the crisis in literary aesthetics. 3 units per semester. *Staff*

245, 246. French Literature of the Twentieth Century. First semester: to 1935, emphasis on Gide, Mauriac, and Malraux. Second semester: after 1935, emphasis on Sartre, Camus, and the *nouveau roman*. 3 units per semester. *Cordle*

For Graduates

311, 312. French Seminar. Each semester one of the following topics will be selected for intensive treatment: studies in sixteenth-century literature, studies in eighteenth-century literature, studies in nineteenth-century literature, studies in seventeenth-century literature, studies in contemporary literature, and studies in medieval literature. 3 units per semester. *Auld, Cordle, Fowlie, Tétel, and Vincent*

———. **Graduate Reading Course.** An intensive course in French to develop rapidly the ability to read French in several fields. Graduate students only. No credit.

ITALIAN

For Seniors and Graduates

283. Italian Novel of the Novecento. Currents in Italian fiction and representative works of novelists from Svevo to the most recent trends and writers. 3 units. *Caserta*

284. Dante. *La Vita Nuova* and a close reading of the *Inferno*. (Conducted in English.) 3 units. *Fowlie*

288. The Renaissance. Petrarch, Boccaccio, and Ariosto. 3 units. *Tétel*

SPANISH

For Seniors and Graduates

251. The Origins of the Spanish Novel. A critical study, based on close reading and discussion, of selected examples of the principal genres of the early novel: the *Amadis de Gaula*, Diego de San Pedro's *La cárcel de amor*, the *Abencerraje*, the *Lazarillo*, Montemayor's *Diana*. 3 units. *Wardropper*

252. Spanish Lyric Poetry Before 1700. A critical study, based on close reading and discussion, of selected poems of the Middle Ages, Renaissance, and Baroque. Special emphasis on the *Razón de amor*, *la poesía de tipo tradicional*, and Santillana; on Garcilaso, San Juan de la Cruz, Fray Luis de León, and Herrera; on Góngora and Quevedo. 3 units. *Wardropper*

253. The Origins of the Spanish Theater. A study of the evolution of the Spanish theater from the *Auto de los Reyes Magos* (twelfth century) through the end of the sixteenth century. The idea of the theater as dramatic poetry will be stressed; close reading of texts by Gómez Manrique, Encina, Gil Vicente, Torres Naharro, Lope de Rueda, Juan de la Cueva. 3 units. *Wardropper*

255, 256. Modern and Contemporary Latin American Literature. First semester: the coming of age of Latin American poetry in the nineteenth and twentieth centuries. Second semester: trends in twentieth-century Latin American fiction. 3 units per semester. *Fein*

257. Old Spanish. The historical development of the language together with illustrative readings. 3 units. *Davis*

258. Old Spanish Literature. An introduction to the reading of medieval Spanish literary texts. 3 units. *Davis*

259. Spanish Phonetics. A phonemic approach to the study of Spanish sounds. Remedial pronunciation drills with special emphasis on rhythm and intonation. Readings in current studies of phonology. 3 units. *Predmore*

261. Nineteenth-Century Novel. A study of literary trends in the last half of the nineteenth century. Readings will be selected from the novels of Valera, Pereda, Galdós, Pardo Bazán, Blasco Ibáñez, and their contemporaries. 3 units. *Davis*

262. Galdós. Works selected from the *Novelas contemporáneas*, the *Episodios nacionales*, and his drama. One course. *Davis*

265. Golden Age Literature: Cervantes. The life and works of Cervantes with special emphasis on his *Quijote*. 3 units. *Predmore and Wardropper*

266. Golden Age Literature: The Drama. Study of the chief Spanish dramatists of the seventeenth century with readings of representative plays of this period. 3 units. *Wardropper*

275, 276. Contemporary Spanish Literature. First semester: the essay and lyric poetry. A study of the revision of national values and literary expression in the twentieth century, with particular reference to the crisis of 1898 and to the en-

richment of the Spanish tradition through extra-peninsular influences. Second semester: the novel. A study of tradition and innovation in the twentieth-century Spanish novel with emphasis on the novels of Unamuno, Baroja, Valle Inclán, and Pérez de Ayala. 3 units per semester. *Predmore*

For Graduates

321, 322. Hispanic Seminar. Each semester one of the following topics will be selected for intensive treatment: the Spanish language in America, studies in medieval literature, studies in the literature of the Golden Age, studies in Latin American literature, studies in the Spanish Renaissance and Baroque, studies in Spanish poetry, studies in nineteenth-century Spanish literature, and studies in twentieth-century literature. 3 units per semester. *Davis, Fein, Predmore, and Wardropper*

ROMANCE LANGUAGES

218. The Teaching of Romance Languages. Evaluation of objectives and methods; practical problems of language teaching at the elementary, secondary, and college levels; analysis of textbooks, tests, and audiovisual aids; applied linguistics. 3 units. *Hull*

Slavic Languages and Literatures

Associate Professor Krynski, *Chairman and Director of Graduate Studies* (314 Foreign Languages); Associate Professor Jezierski; Assistant Professors Foster and M. Pavlov; Lecturer Gogolewski

The Department of Slavic Languages and Literatures inaugurated in 1971 a graduate program leading to the A.M. degree. Initially, graduate students will be able to major only in Russian language and literature, but there will be limited training in the language and literature of Poland.

Applicants should have sufficient undergraduate preparation in the Russian language to enable them to read Russian classical literature in the original.

For Seniors and Graduates

201, 202. The Novelists of Nineteenth-Century Russia. Development of the Russian novel against the European background, with emphasis on Dostoevsky and Tolstoy. Extensive readings in English. 3 units per semester. *Krynski*

203. The Slavs: Literature and Culture, 1918-1939. Study of the cultures of Poland, Czechoslovakia, Yugoslavia, and Bulgaria using representative literary masterpieces. Comparative and contrastive study with attention to the Soviet influences. Readings in English. 3 units. *Krynski*

204. The Slavs: Literature and Culture, 1940-1970. Study of the cultures of Poland, Czechoslovakia, Yugoslavia, and Bulgaria using representative literary masterpieces. Comparative and contrastive study with special emphasis on the process of cultural de-Stalinization both in Eastern Europe and in the Soviet Union. Readings in English. 3 units. *Krynski*

***205. The Structure of Polish in Relation to Russian.** Comparative and contrastive study of the two major Slavic languages. Considerable emphasis placed on preparing students to read Polish literary texts. 3 units. *Krynski*

***206. Readings in Contemporary Polish Prose in the Original.** Stylistic analysis of aphoristic prose by Lec, philosophical allegories by Kolakowski, and short stories by Mrozek and Hkasko. 3 units. *Krynski*

207. Soviet Literature and Culture. Literature since 1917, as a continuation of nineteenth-century traditions and as a response to Soviet ideology. Readings (in English or Russian) from major works of prose, poetry and drama. 3 units. *Jezierski*

212. Pushkin. A survey of his life and works, with attention given to his role as a precursor of modern Russian Literature. Readings in English or Russian. Prerequisite: Russian 101, or consent of the instructor. 3 units. *Krynski*

215, 216. Advanced Composition and Syntax. A detailed study of the morphological and syntactic structure of modern Russian. Compositions based on literary topics. Prerequisites: Russian 91, 92 or instructor's permission. 3 units per semester. *Pavlov*

***224. The Russian Short Story—Eighteenth Century to the Present.** Readings of stories by such masters of the genre as Pushkin, Gogol, Turgenev, Tolstoy, Dostoevsky, and Chekhov. Readings in English and in Russian. 3 units. *Jezierski*

225. Tolstoy. A study of his life and works. The novels, short fiction, plays, and other writings considered in the light of his world significance. 3 units. *Jezierski*

***227. Gogol.** Life and works: short stories, dramas and the novel. Readings in English and in Russian. 3 units. *Jezierski*

230. Chekhov and the Russian Prose of the Turn of the Century. Structural analysis of Chekhov's short stories and plays against the background of contemporary Realist, Impressionist, Symbolist, and Decadent trends in Russian prose. 3 units. *Foster*

232. Fyodor Dostoevsky. A close examination of his major fiction. 3 units. *Jezierski*

***233. Ivan Turgenev.** The novels, short stories, and drama of Turgenev. 3 units. *Krynski*

***236. Russian and Polish Romanticism.** Prose, poetry, and drama of such major writers as Pushkin, Lermontov, Mickiewicz, and Krasinski presented against the background of the Romantic movement in Western Europe. 3 units. *Krynski*

237. Survey of Old Russian Literature and Civilization. Pagan folklore, translated and original works of the various medieval genres, the Russian Baroque, the folk literature, the theatre through 1725. Lectures and discussions in English; readings in English and Russian. 3 units. *Foster*

*Not offered in 1972-73.

***238. Russian Literature of the Eighteenth and Early Nineteenth Centuries.** Analysis of poetry, drama, and prose of the neo-classical, the Rococo, the sentimental, the pre-Romantic movements. Survey of the literary polemics of the period. Lectures and discussions in English; readings in English and Russian. 3 units. *Foster*

***240. Twentieth-Century Russian Poetry.** Reading in Russian and analysis of poetry of the pre-revolutionary movements of Symbolism, Acmeism, Futurism, Imaginism, and of post-revolutionary poetry both in the Soviet Union and abroad. 3 units. *Foster*

Sociology and Anthropology

Professor Back, *Acting Chairman* (268 Sociology-Psychology Building); Professor Wilson, *Director of Graduate Studies for Sociology* (328 Sociology-Psychology Building); Assistant Professor O'Barr, *Director of Graduate Studies for Anthropology* (264 Sociology-Psychology Building); Professors Buettner-Janusch, Kerckhoff, La Barre, Maddox, McKinney, Myers, Preiss, Smith, Tiryakian, and Roy; Associate Professors Apte, Crocker, Fox, Palmore, and Simpson; Assistant Professors Bowers, Brehm, Hartford, Mason, and Murch

The department offers graduate work leading to Ph.D. degree in sociology and in anthropology. Before undertaking advanced work in this department, a student must have completed a minimum of 12 semester hours of approved preliminary courses in his chosen discipline, and an additional 12 semester hours in the field or in related work. Applicants for admission should submit scores on the Graduate Record Examination, especially the Aptitude Test.

Candidates for the Ph.D. degree in sociology are expected to demonstrate in qualifying and preliminary examinations a broad background in the various aspects of sociology—substantive, theoretical, and empirical. The program of each candidate is determined by a committee which reviews his previous work and sets the specific requirements to be met. These requirements will include work in related fields such as anthropology, economics, mathematics, philosophy, political science, or psychology. Emphasis is placed on the completion of the dissertation, directed by a member of the staff, demonstrating competence and independence in the investigation of an original and significant problem.

Candidates for the Ph.D. degree in anthropology must show evidence by preliminary or qualifying examination of a command of a major field within the discipline. The department recognizes the trend in modern anthropology toward interdisciplinary research, and part of the anthropology course requirements may be replaced by advanced work in anatomy, economics, sociology, zoology, and other disciplines relevant to the student's program.

Further details of these programs, the departmental facilities, the staff, and various stipends available are described in a brochure which may be obtained from either the Director of Graduate Studies for Sociology or the Director of Graduate Studies for Anthropology, Department of Sociology and Anthropology.

*Not offered in 1972-73.

SOCIOLOGY

For Seniors and Graduates

241. Social Stratification. The nature of hierarchical and vertical differentiation in the economic, political, and prestige structures in modern societies. The interrelationship of class, status, and power strata and their influence on social institutions, personality structure, and group and individual behavior. 3 units. *Mason and Roy*

242. The Sociology of Occupations and Professions. The social significance of work. Analysis of forces changing the contemporary occupational structure, typical career patterns of professions and occupations, the social organization of occupational groups. 3 units. *McKinney and Simpson*

243. Population Dynamics and Social Change. Introduction to demographic analysis. The relationship between the demographic structure of society and its social organization. 3 units. *Hartford and Myers*

247. Community and Society. This course seeks to provide a frame of reference for the analysis and ordering of facts pertaining to the diverse cultures of the world, the State, the world community, the Great Society, news, mass behavior, social problems, races, and classes. 3 units. *Staff*

251. The Sociology of Modernization. Changes, obstacles to change, and structural strains which occur in kinship, stratification, bureaucracy and the role of the military, occupations and work, communications, and values and ideologies, during modernization. 3 units. *Murch and Tiryakian*

253. Social Institutions. The study of particular institutions and the social movements out of which they developed, with emphasis on the development of general propositions concerning the nature, function, and importance of institutions in society. 3 units. *Staff*

255. Race and Culture. A comparative study of race relations in world perspective developed around such themes as races and personal identity, the geography and ecology of race relations, the idea of race, and race conflict. 3 units. *Palmore*

259. Religion and Social Change. A study of the role of religion in significant social changes in Western and non-Western societies. Emphasis given to non-institutional phenomena (charisma, prophecy, messianism, revivals, glossolalia). Prerequisite: Anthropology 264 or Sociology 151, or the equivalent. 3 units. *Tiryakian and Wilson*

272. The Socialization Process. A consideration of the universal societal requirement for replacement of socialized personnel with major concentration on the process in Western society. Particular attention is given to variations in socialization by position in the social structure (class, caste, urban-rural) and to the contributions made by various socialization agencies (family, school, peer groups, mass media). 3 units. *Kerckhoff*

275. Social Attitudes and Individual Behavior. Such issues as the follow-

ing are considered: the importance of symbolic interaction, the development of the "self," the social structuring of the socialization process, individual movement within the social structure, and the importance of membership groups and reference groups. 3 units. *Back and Kerckhoff*

278. Social Structure and the Life Cycle. A study of the relationship between age as a social characteristic and social interaction, with particular reference to adolescence and old age. 3 units. *Maddox*

295. Methodology in Sociology. Considerations of the nature of scientific method, as well as alternative paths to knowledge, as they apply to sociology. Conceptualization, hypothesis formation, and definition. The research process as a decision-making situation both on the general level of research design and the specific level of special techniques. The process and logic of data analysis. Relations of theory and research are stressed. 3 units. *Back, Mason, and Smith*

297. Statistical Analysis in Sociology. Such techniques as zero and higher order linear and curvilinear correlation, partial correlation, analysis of variance and covariance and factorial design are studied. Where possible, analogous non-parametric techniques are also considered. 3 units. *Brehm, Hartford, and Mason*

For Graduates

301. Seminar in Human Fertility. Special topics in human fertility including: theory of demographic transition, fertility in Latin America, design and evaluation of family planning programs, fertility and problems of modernization, and family structure and fertility. 3 units. *Hartford and Myers*

302. Seminar in Migration. Special topics in migration including: Latin American rural-urban migration, urban migration policy, contemporary migration theories, and international migration. 3 units. *Hartford, Myers, and Smith*

325. Social Aspects of Mental Illness and Treatment. An examination and critique of sociological research and theory in the epidemiology, etiology and treatment of mental illness. Such topics as the effect of mental illness on the family, the structure and function of various treatment systems, and major problems of methodology will receive emphasis. 3 units. *Back and Preiss*

341. Special Problems of Complex Systems

Industrial and Professional Systems. Analysis of problems of organization of work in such diverse settings as industrial plants, hospitals, and public administration groups. Problems of decision-making, recruitment, allocation of authority, informal organization, interorganizational relations. 3 units. *McKinney, Pondy, and Roy*

Mass Communications. Theoretical problems in defining and distinguishing communication, communicative acts, communication processes, and communication systems. Work aimed toward the derivation of models and theories for each of these will be pursued. Students must have permission of the instructor. 3 units. *Smith*

Urban Society. Analysis is made of the varying mechanisms through which urban society is integrated, how urbanites develop a sense of identification with

the community, and the extent and mode of social dominance of the city in the larger society. 3 units. *Myers and Smith*

Human Ecology. An examination of such issues as the logic and utility of the ecological approach; the possibility of testing current ecological theories in non-Western, non-urban environment; alternative explanations for the spatial patterning of social phenomena; selected methodological problems. 3 units. *Myers and Smith*

344. Workshop on Computer Models of Social Systems. The methodology of building mathematical and logical models of social systems and computer simulation experiments with such models. The types of models and social systems surveyed have applications in business administration, economics, education, political science, psychiatry, psychology, and sociology. Participants in the workshop will develop and conduct simulation experiments with a model of some complex social system, such as a city, state, region, or nation. 3 units. *Naylor*

345, 346. Demographic Techniques I and II. Measurement and methodology in demography. The first course will deal primarily with basic measurement techniques including standardization, construction of the life table, period and cohort measures of fertility, and introduction to classical population theory. The second will be devoted to the analysis of complex models such as family building models and growth and projection models and the preparation of a research topic. 3 units per semester. (Also listed as Economics 345, 346.) *Hartford and Myers*

351, 352. Seminar in Social Organization. Examination of such problems as the bases of social cohesion and continuity, the sources and effectiveness of social control mechanisms, the problem of social change in structural-functional theory. 3 units per semester. *Maddox and Pondy*

361. Seminar in Comparative Sociology. Major emphasis on the relevance of evolutionary, functional, and structural theories for explaining the findings of comparative studies. 3 units. *Murch and Myers*

373, 374. Social Psychological Issues in Sociology. Detailed exploration of selected problem areas such as the theory and measurement of social attitudes, role discontinuity and personality disorders, applications of reference group theory, the socialization process. 3 units per semester. *Back, Kerckhoff, and Preiss*

381. Development of Sociological Theory. An analysis of the development, convergence, and utilization of sociological theory. 3 units. *Murch, Tiryakian, and Wilson*

385, 386. Seminar in Sociological Theory. Detailed analysis of methodological and substantive problems in utilizing comprehensive, middle-range, and discrete theories in varied sociological areas. Major emphasis on the use of theory in empirical research. Prerequisite: Sociology 381 or equivalent. 3 units per semester. *McKinney and Tiryakian*

392. Individual Research in Sociology. Students will conduct on an individual basis research designed to evaluate a sociological hypothesis of their choice.

The process must be completed by preparation of a report on this research in adequate professional style. Prerequisite: Sociology 295 or permission of the instructor. 3 units. *Back, Mason, and Smith*

397, 398. Seminar in Special Research Problems. Treatment in depth of either selected methodological issues and/or methods. Examples of possible topics include scaling, methods of machine data processing, validation and induction, theory construction, quantification, interviewing, measurement, sampling plans, development of research designs from statistical models, methodological research, experimental techniques, demographic techniques, the relation of theory to research, and the role of statistical methods in sociology. Prerequisite: permission of instructor. 3 units each semester. *Staff*

402. Interdisciplinary Seminar in the History of the Social Sciences. A survey of the theories, methods and tools applied to problems in the history of the social sciences. 3 units. *Goodwin, Holley, Spengler, Spragens, and Tiryakian*

ANTHROPOLOGY

For Seniors and Graduates

220. Society and Culture in India. The basic features of Indian cultures and societies from an anthropological perspective. The impact of selected technological and social changes upon the individual, caste, and community. 3 units. *Fox and Apte*

222. Topics in African Anthropology. Current research problems in African anthropology, as illustrated by an intensive and continuing study of a tribal society. Interpretation of the results of field research in terms of contemporary theories about culture and society. 3 units. *O'Barr*

231. Human Evolution I. See course description for Anatomy 231. (Also listed as Anatomy 231 and Zoology 131.) *Buettner-Janusch and Cartmill*

232. Human Evolution II. See course description for Anatomy 232. (Also listed as Anatomy 232 and Zoology 132.) 3 units. *Buettner-Janusch and Cartmill*

236. Human Genetics. See course description for Anatomy 236. (Also listed as Anatomy 236, Zoology 236, and under the University Program in Genetics.) 3 units. *Buettner-Janusch*

238. Language and Society. An introduction to the study of language and society. Universal features of language, languages as a mirror of society and social perception through language, language as a coding system, linguistics and anthropology, applied linguistics. Prerequisite: Linguistics 101 or permission of instructor. 3 units. *Apte*

240. Indo-Aryan Linguistics. Historical development of Indo-Aryan languages from Sanskrit to the modern period. A comparative analysis of modern Indo-Aryan languages as regards phonology, morphology, syntax and lexicon. Impact of non-Indo-Aryan languages on the structure and lexicon of Indo-Aryan languages. Prerequisite: Linguistics 101 or permission of instructor. 3 units. *Apte*

242. Topics of Prehistory. Anthropological issues, derived from archeological and early historical investigations. Prerequisite: Anthropology 93 and 94 or equivalent. 3 units. *Bowers*

249. Economic Anthropology. The study of economic organization and behavior in preliterate, peasant, and transitional societies. Problems in the analysis of ownership and distribution. The relationship of economic processes to norms and institutions such as markets. 3 units. *Crocker and O'Barr*

260. Linguistic Anthropology: Phonemics. Application of descriptive linguistics to analysis of language; concentration on the sound system of a South Asian language, and/or other non-Western languages. Prerequisite: permission of the instructor. 3 units. *Apte*

261. Linguistic Anthropology: Morphology and Syntax. Application of descriptive linguistics to analysis of language; concentration on the grammatical system of a South Asian language, and/or other non-Western languages. Prerequisite: Anthropology 260 or permission of the instructor. 3 units. *Apte*

262. Anthropology of Law. Legal decision in pre-literate societies. The interrelationships of law, ritual, and myth. 3 units. *Crocker and Fox*

263. Primitive Art and Music. A comparative ethnological study of the data and theories concerning non-European music and art; sufficient technical background will be provided for non-specialist students. Recordings, slides, and museum artifacts will be used. 3 units. *La Barre*

264. Primitive Religion. The ethnology, social functions, and the socio-psychological meanings of religion in primitive societies. 3 units. *La Barre*

265. Personality and Society. The developmental social psychology of human personality, its origin in the primary group, its nature and varieties and its integrations into secondary group institutions. Prerequisite: permission of the instructor. 3 units. *La Barre*

266. Personality and Culture. The influence of culture patterns and social institutions upon character structure, socialization of the individual, and the dynamics of human personality. Comparative anthropological materials will be drawn upon. Prerequisite: permission of the instructor. 3 units. *La Barre*

276. Analysis of Kinship Systems. A study of primitive relationship categories and the ways in which they are related to legal norms and ritual and social groupings. Theoretical issues and contrasting approaches to the analysis of social classification terminologies. 3 units. *Crocker*

278. Special Topics in Political Anthropology. Current research problems in political anthropology. Topic will change each semester. 3 units. *O'Barr*

280, 281. Seminar in Selected Topics. Special topics in methodology, theory, or area. Prerequisite: permission of the instructor. 3 units per semester. *Staff*

291, 292. Anthropological Theory. Theoretical, methodological, and comparative issues in anthropology. 3 units per semester. *Crocker and Fox*

For Graduates

330. Seminar in Anthropology. A seminar for advanced students who wish to pursue individual studies in social and cultural anthropology. Offered both semesters. 1 to 3 units per semester. *Staff*

333. Primate Evolution. See course description for Anatomy 333. (Also listed as Anatomy 333 and Zoology 333.) 3 units. *Buettner-Janusch and Cartmill*

334. Topics in Physical Anthropology. See course description for Anatomy 334. (Also listed as Anatomy 334 and Zoology 334.) 3 units. *Buettner-Janusch and Cartmill*

393. Individual Research in Anthropology. A course for the student preparing the A.M. thesis or the Ph.D. dissertation. Supervision and guidance of intensive research on a problem approved by the student's departmental advisory committee. 3 units. *Staff*

402. Interdisciplinary Seminar in the History of the Social Sciences. A survey of the theories, methods, and tools applied to problems in the history of the social sciences. 3 units. *Goodwin, Holley, Spengler, Spragens, and Tiryakian*

410. Seminar in the Government, History, and Social Structure of India and Pakistan. 3 units. *Fox and Associates*

Zoology

Professor Fluke, *Chairman* (227 Biological Sciences Building); Associate Professor Wainwright, *Director of Graduate Studies* (024 Biological Sciences Building); Professors Bailey, Bookhout, Buettner-Janusch, Costlow, Gregg, Klopfer, Livingstone, Nicklas, Schmidt-Nielsen, and Wilbur; Associate Professors Barber, Gillham, Tucker, Vogel, and Ward; Adjunct Associate Professor Schmidt-Koenig; Assistant Professors Forward, Lundberg, and Sutherland

The Department of Zoology manages a variety of programs tailored to individual needs of students seeking A.M. or Ph.D. degrees.

In general, a student entering the department will be equipped to pursue an advanced degree if he has completed an undergraduate major in biology along with some formal training in college-level chemistry, mathematics, physics, and foreign languages.

Nevertheless, in recognition and support of the modern trend toward interdisciplinary research, the department is prepared to accept promising students with less orthodox academic backgrounds and is ready to encourage any student wishing to undertake a program of study leading, in effect, to an interdisciplinary degree sponsored by the department.

Thus, all students are urged to search widely in the *Bulletin of Undergraduate Instruction* and the *Bulletin of the Graduate School* for information about the intellectual resources of the University. Special attention, perhaps, should be given to announcements of the Departments of Anatomy, Biochemistry, Botany, Chemistry, Geology, History, Mathematics, Microbiology and Immunology, Philosophy, Physics, Physiology and Pharmacology, Psychology, Sociology and Anthropology, and

Zoology; announcements of the Schools of Engineering and Forestry should also be consulted.

For Seniors and Graduates

201. Animal Behavior. A review of the major developments in the field, with emphasis on recent physiological and developmental studies. Prerequisites: physiology, genetics and evolution, or consent of instructor. 3 units; 4 units with laboratory. *Klopfer*

203. Marine Ecology. Ecological processes as exemplified by marine organisms; environmental factors, intra and interspecific relationships; community ecology. Readings, discussion, written papers, and computer use. Field projects using modern methods. Prerequisites: a course in general biology, invertebrate zoology or the equivalent, and a year of mathematics, some knowledge of statistics will be helpful. (Given at Beaufort.) 6 units. *Sutherland*

205. Elements of Theoretical Biology. An introduction to elementary mathematical biology, conceived as the study of axiomatized mathematical theories and their biological models. Prerequisites: introductory college biology and mathematics, or consent of instructor. 3 units *Gregg*

212. Marine Membrane Physiology. See course description for Physiology 212. (Also listed as Physiology 212.) (Given at Beaufort.) 6 units. *Gutknecht, Schoffeniels, Wachtel, and Staff*

213. Ecological Oceanography. Population ecology and energy relationships of life in the open ocean. Lectures, seminars, and some sea-time. Prerequisites: courses in ecology or invertebrate zoology, chemistry, and calculus; a course in differential equations is strongly recommended. 3 units. *Staff*

214. Biological Oceanography. Composition in time and space of marine biosphere in relation to descriptive marine chemistry, physics, and geology. Some work at sea aboard the research vessel. Prerequisites: a course in invertebrate zoology, ecology, marine biology or an appropriate equivalent; chemistry through organic, one year of physics and mathematics. (Given at Beaufort.) 6 units. *Barber*

216. Limnology. A study of lakes, ponds, and streams, including their origin, development, geochemistry, energy balance, productivity, and the dynamics of plant and animal communities living in them. Lectures, field trips, and laboratory work. Usually offered in alternate years. Prerequisites: introductory college biology, chemistry, physics, and Mathematics 31; or permission of instructor. 3 units; 4 units with laboratory. *Livingstone*

224. Vertebrate Zoology. A study of life histories, adaptations, ecology, and classification of vertebrate animals. Prerequisite: Zoology 56. 4 units. *Bailey*

229. Morphogenetic Systems. Lectures on the interplay of theory and experiment in twentieth century developmental biology. Prerequisite: introductory biology. 3 units. *Gregg*

236. Human Genetics. See course description for Anatomy 236. (Also

listed as Anatomy 236, Anthropology 236, and under the Genetics Program.) 3 units. *Buettner-Janusch*

240. Chemical Oceanography. Physiocochemical properties of seawater. Lectures, laboratory work, and field trips. Prerequisite: a year of analytical or physical chemistry, an introductory course in general or physical oceanography or permission of the instructor. (Also listed as Chemistry 240.) (Given at Beaufort.) 6 units. *Staff*

242. Cytological Materials and Methods. General cytological analysis, with emphasis on chromosome studies using current optical, cytochemical, and other experimental techniques. Prerequisites: Zoology 243 or equivalent, and permission of instructor. 2 units. *Nicklas*

243. Cytology. See course description for Botany 243. (Also listed as Botany 243.) 3 units. *Anderson and Nicklas*

244. Topics in Cell Structure and Function. See description for Anatomy 244. (Also listed as Anatomy 244.) 2 units. *Moses and Nicklas*

245. Radiation Biology. Actions of ionizing and excitational radiations on life processes; biological use of radioactive tracers; nucleonics. Prerequisites: college physics, mathematics, and chemistry. 3 units; 4 units with laboratory. *Fluke*

246. Physical Biology. Physical principles of structure and function in large biological molecules and aggregates, applications to function at higher levels of organization, and to biological fitness. Prerequisites: college mathematics, chemistry, physics, and one biology course beyond the introductory course, or consent of instructors. 4 units. *Fluke and Wainwright*

248. Introductory Biochemistry. See course description for Biochemistry 247. (Also listed as Biochemistry 247.) 3 units. *Tanford*

250. Physiological Ecology of Marine Animals. A study of the physiological responses of marine animals in relation to certain environmental factors and evolution. Animals representing numerous phyla from various habitats are studied. (Given at Beaufort.) Prerequisite: a course in physiology. 6 units. *Staff*

252. Comparative Physiology. The physiological mechanisms of animals studied on a comparative basis. Prerequisite: Zoology 151 or equivalent. 4 units. *Schmidt-Nielsen*

271. Cell Physiology. Studies of the physiological activities and mechanisms of cells and their components. Recent advances in cell biology. 4 units. *Wilbur*

274. Marine Invertebrate Zoology. Structure, functions, and habits of invertebrate animals under normal and experimental conditions. Field trips will be made to study, collect, and classify animals in their natural habitats. Prerequisite: introductory college biology. (Given at Beaufort.) 6 units. *Staff*

275. Invertebrate Zoology. Lectures, readings, and laboratory work dealing with free-living and parasitic invertebrates. Field trips to aquatic habitats. Students cannot be given credit for 274 in addition to this course. 4 units. *Bookhout*

276. Comparative and Evolutionary Biochemistry. See course description for Biochemistry 276. (Also listed as Biochemistry 276.) 6 units. *Sullivan*

278. Invertebrate Embryology. Lectures, readings, and laboratory work dealing with rearing, development, and life history of invertebrates. 4 units. *Bookhout*

280. Principles of Genetics. See course description for Botany 280. (Also listed as Botany 180, Botany 280, and under the University Program in Genetics.) 3 units. *Boynton, Gillham, and Others of the University Program in Genetics*

283. Developmental and Cellular Genetics. See course description for Genetics 283. (Also listed as Botany 283 and in the University Program of Genetics.) 2 units. *Boynton (Botany) and Gillham*

288. The Cell in Development and Heredity. See course description for Anatomy 288. (Also listed as Anatomy 288 and under the University Program in Genetics.) 2 units. *Counce, Gillham, and Staff*

295, 296. Seminar. Topics and instructors announced each semester. 2 units. *Staff*

For Graduates

333. Primate Evolution. See course description for Anatomy 333. (Also listed as Anatomy 333 and Anthropology 333.) 3 units. *Buettner-Janusch*

334. Topics in Physical Anthropology. See course description for Anatomy 334. (Also listed as Anatomy 334 and Anthropology 334.) 3 units. *Buettner-Janusch*

351, 352. Departmental Seminar. A weekly meeting of graduate students and faculty to hear and discuss research reports. 1 unit credit by arrangement. *Staff and Invited Lecturers*

353, 354. Research. To be carried on under the direction of the appropriate staff members. Hours and credits to be arranged. *Staff*

355, 356. Seminar. One or more seminar courses in particular fields are given each semester by various members of the staff. These will be in the fields indicated under Zoology 353, 354. 2 units. *Staff*

360, 361. Tutorials. Students will write essays based on reading of literature. Essays will be discussed and critically evaluated in meetings. 2 units per semester. *Staff*

394. Marine Membrane Physiology. See course description for Physiology 212. (Also listed as Physiology 212.) *Gutknecht, Schoffeniels, Wachtel, and Staff*

Genetics, The University Program. Genetics courses offered by the Department of Zoology are part of The University Program in Genetics; see announcement in this *Bulletin*.

Marine Laboratory. The following courses are given at Duke University Ma-

rine Laboratory, Beaufort, N.C.: 169, *The Marine Environment*; 171, *Marine Sciences Seminar*; 203, *Marine Ecology*; 214, *Biological Oceanography*; 240, *Chemical Oceanography*; 250, *Physiological Ecology of Marine Animals*; 274, *Marine Invertebrate Zoology*; 276, *Comparative and Evolutionary Biochemistry*. Consult Marine Sciences in this *Bulletin* for other offerings at the Duke University Marine Laboratory.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Latin America. Refer to the section Organization for Tropical Studies in this *Bulletin* in the chapter on Special and Cooperative Programs.



ADVANCED DEGREES CONFERRED JUNE 7, 1971

Master of Arts

Alexander, Elaine Elliston
Alexander, Nancy Jean
Angell, Ralph McLean, Jr.
Babad, Yael Enia
Baker, Catherine
Ballagh, Robert Seney, Jr.
Bennett, Eldon J.
Blackwelder, Patricia Lurie
Boyce, Merrill Tilghman
Brown, Harry Dean
Bruce, Lenecia L.
Bybee, Howard Curtis
Chevarley, Frances Margaret
Clarke, Mary-Jane
Comfort, Alexander Freeman
Crowley, Terence Allan
Currie, Ruth Douglas
Dalbey, Walden Earl
de Montluzin, Emily Lorraine
DiCorcia, Joseph Nicholas
Dunaway, John Marson
Ebben, James Adrian
Farnham, William Frederick
Fedak, Michael Andre
Fitzgerald, Bruce David
Fleeger, Wayne Robert
Flynn, John McGavock
Fogleman, Ronald Robert
Freund, Robert Elmer
Gentile, Anthony Michael, Jr.
Gough, Robert Anthony, Jr.
Gradek, Barbara Dolata
Graham, David Martin
Grant, Jane Maxwell
Gratz, Robin James
Gregg, Eugene Stuart, III
Grewe, Hartmut
Gunsburg, Jeffery Albert
Hagglund, Lee Oliver
Hansen, Linda Ruth
Hardymon, G. Felda
Hartle, Anthony Elwood
Harvan, Donald James
Helms, Denise Marie
Hines, George William
Hines, Samuel Middleton, Jr.
Holden, Merle Gwendoline
Holden, Paul
Holmes, John L.
Hummer, Patricia Myles
Intarasalee, Nobpamart
Keenan, Ann-Marie
Keisaku, Shimada
Kingsley, Marcia Stevenson
Kostyu, Joel Alexander
Kurtzweg, Laurie Rogers
Latimer, Berkley Wells
Lavalle, Eduard Marcus
Lenhardt, Wayne Alexander Joseph
Lockey, Donald Vincent
Lubega, Germina Namatovu
Lutz, JoAnn
Mackie, Myra Beth
Manton, Kenneth Grant
Martz, David Joshua, Jr.
Messer, John Davis, Jr.
Moore, Marie D.
Murley, James Irvin
Muro, Alex Joseph
Murphrey, Elizabeth Hobgood
Paschall, Jim Roddy
Patterson, David Thomas
Pavlik, Alan Mark
Petridis, Anastasios
Reyling, Theodora R.
Rhoads, Sandra Roberts
Richardson, Malcolm Lynn
Rinella, Vincent Joseph, Jr.
Rivers, Robert Hayne, Sr.
Rooney, William Stephen, Jr.
Ruedy, Ralph Herman
Russell, John Winfree, Jr.
Sabre, Ru Michael
Sanders, Betty Anne Benbow
Strausser, Sharon Leigh
Tesi, Raymond Francis, Jr.
Troyer, Michael David
Tyrrell, Ian Robert
Weaver, John Charles
Weck, Susan Gale
Whittington, Frank Joseph
Windham, Donald Hugh
Winstead, Ray Lynn
Wood, Thomas John

Master of Arts in Teaching

Arrington, Jane Carwile
Caliendo, Josephine Mary
Denny, Flow Ellen
Gardiner, Cynthia Leigh
Garriss, Mary Linda
Hill, Richard Nelson

Hinds, Frank Carrol
Juon, Sarah Lindberg
Smith, Sherry Norton
Thwaite, Susan Godwin
Washburn, John William, Jr.
Wheeler, Theodosia Clark

Master of Education

Barry, Donald W.
Bloom, Carolyn Demarest

Cook, Brenda Paulette
Cox, Anna Bartel

Friedlein, David Harper
 Hartung, Anne Claire
 Lopez, Maricel Gaston
 Mazula, Joanne
 Mickens, Sharon Ann B.
 Miller, Lee Mackubin
 Ness, Jane Hoover
 Petillo, Jean Brummal

Renager, Burton Whitmon, Jr.
 Schanberg, Rachel W.
 Schnabel, Timothy Arthur
 Thomas, Nancy Lou
 Traicoff, Elaine
 Walker, Vernita Matillar
 Webb, Betty Anita
 Wonnacott, William Curtis

Master of Science

Alpay, Bilal Inan
 Bazemore, Thomas Russell, Jr.
 Bengoa, Gustavo Cordova
 Bentz, Raymond Leland
 Chen, De-Yu
 Evans, Robert Henry
 Godhania, Avada Lagdhir

Karakoc, Cengiz
 Kauffman, Sidney Lloyd, Jr.
 Kumar, Subramanian
 Liladhar
 Minnetyan, Levon
 Moseley, James Lee
 Ployart, Louis Marie

Master of Hospital Administration

Andruk, Richard Dean
 Bentley, William Charles, III
 Betzold, Paul Frederick, Jr.
 Dozier, James Lawrence, Jr.
 Feldman, Mark I.
 Gardner, Dahl Toland
 Hamilton, James Eldon
 La Fond, Jean Baptiste
 Minicucci, Richard F.

Muhlenhaler, Philip Donald
 Nunnery, Stacy Arnold
 Sandoval, Donald Duncan
 Schwartz, Michael Joel
 Seaver, Douglass James
 Wiles, Paul Martin
 Wolley, Daniel James
 Young, Larry Henry

Master of Science in Nursing

Burke, Dorothy
 Helmann, Eleanor Mary
 O'Dell, Margaret Louise

Page, Bonnelyn
 Smith, Ruth Myrle

Doctor of Education

- Clark, El Nadal (B.S., Richmond Professional Institute; M.Ed., Duke University). *Education*. Dissertation: "Analysis of the Differences Between Pre- and Post-test Scores (Change Scores) on Measures of Self-Concept, Academic Aptitude, and Reading Achievement Earned by Sixth Grade Students Attending Segregated and Desegregated Schools"
- Cohen, Peter (B.S., M.Ed., Boston University). *Education*. Dissertation: "Perceived Barriers to the Counselor's Role Performance"
- Cole, Henry Campbell (B.A., Wake Forest University; M.A., East Carolina University). *Education*. Dissertation: "Educational, Financial, and Administrative Characteristics Associated with a Possible Merger of the Wilson City, Elm City, and Wilson County School Systems in North Carolina"
- Davis, Anita Price (B.S., M.A., Appalachian University). *Education*. Dissertation: "The Comprehensive School Improvement Project in North Carolina"
- Fuller, John Adams (B.Sc., M.Sc., Michigan State University). *Education*. Dissertation: "A Comparison of the Characteristics of Early-Leavers with Those of Graduates from Technology Programs of Selected Michigan Community Colleges"
- Grier, Lee Wendell (B.A., High Point College; M.Ed., University of North Carolina at Greensboro). *Education*. Dissertation: "The History of the Teaching of Sociology in the Secondary School"
- Krajewski, Robert Joseph (B.S., M.S., University of Illinois). *Education*. Dissertation: "A Study of the Effects of Video Taping and Flanders Interaction Analysis Matrix Recordings on Secondary Master of Arts in Teaching Interns"
- Moore, Margaret Lee (B.S., Madison College; M.S., Medical College of Virginia). *Education*. Dissertation: "Interinstitutional Agreements for Clinical Education in Physical Therapy"
- Paschal, Jerry Drew (B.S., High Point College; M.Ed., University of North Carolina). *Education*. Dissertation: "A Conceptual View of the Role of the School Superintendent and the School Board Chairman in North Carolina"

- Perry, James Norman (B.S., District of Columbia Teachers College; B.D., Southeastern Baptist Theological Seminary; M.Ed., Duke University). *Education*. Dissertation: "A Comparative Study of Faculty in College Parallel Division of Public Community Colleges and Faculty of Two-Year Private Colleges in North Carolina"
- Pryor, John Patrick (B.S., Manhattan College; M.A., Columbia University). *Education*. Dissertation: "The Composition and Pattern of Decisions Rendered by Dependent City School Boards"
- Quinn, Ben Devon (B.S., Appalachian University; M.A., East Carolina University). *Education*. Dissertation: "Cost Analysis of North Carolina Senior High Schools"
- Roberts, Andrew Lee (B.S., St. Augustine's College; M.A., North Carolina College). *Education*. Dissertation: "An Analysis of Selected Variables Associated with Voting on School Bond Elections in North Carolina"
- Seifred, Ronald Henry (B.A., Duke University; M.Ed., University of Florida). *Education*. Dissertation: "An Analysis of Decision-Making Patterns as Perceived by Professional Personnel In Selected North Carolina Public School Administrative Units"
- Shuping, Clyde Astor (B.S., Lenoir Rhyne College; M.A., Appalachian University). *Education*. Dissertation: "Judicial and Other Interpretations and Certain Other Aspects Relating to Planned Work Interruptions by Public School Employees"

Doctor of Philosophy

- Adams, Theodore Claude, Jr. (A.B., Earlham College; M.S., Wayne State College). *Chemistry*. Dissertation: "Condensations with Trilithiodianilides and Subsequent Acid Catalyzed Reactions. Stereochemical and Mechanistic Studies"
- Aiken, Susan Hardy (A.B., Furman University; M.A., Duke University). *English*. Dissertation: "The Development of Browning's Imagery in the Dramatic Monologue, 1842-1864"
- Anderson, Thomas William (A.B., Wesleyan University; M.A., Duke University). *Physiology*. Dissertation: "The Ventricular Action Potential. Quantitative Analyses of the Relationship Between the Repolarization Phase and the Pattern of Stimulation"
- Armstrong, Frank Harris (B.S., West Virginia University; M.F., Yale University). *Forestry*. Dissertation: "Selection Forest Yield Regulation by Linear Programming"
- Arneson, Richard Michael (B.S., University of Minnesota). *Biochemistry*. Dissertation: "Part 1 Substrate-Induced Chemiluminescence of Xanthine Oxidase and Aldehyde Oxidase. Part 2 The Binding of Adenosine-5-Monophosphate by Bovine Liver Fructose-1,6-Diphosphatase"
- Aull, James Stroud (A.B., Newberry College; B.D., Lutheran Theological Seminary; S.T.M., Lutheran School of Theology). *Religion*. Dissertation: "Obey My Voice. A Form-Critical Study of Selected Prose Speeches from the Book of Jeremiah"
- Babad, Elisha Yitzhak (A.B., Hebrew University). *Psychology*. Dissertation: "A Cognitive Analysis of the Social Deprivation-Satiation Effect"
- Berry, Willard Miller (A.B., Pomona College). *Political Science*. Dissertation: "The Radical Uses of Parliament: The Dynamics of Legislative Change in India, 1962-1967"
- Berryhill, Judith Lawson (A.B., Western Kentucky University). *Psychology*. Dissertation: "The Total Time Hypothesis in an Aged Population"
- Bhushan, Kul (B.Sc., M.Sc., Punjab Engineering College). *Civil Engineering*. Dissertation: "An Experimental Investigation into Expansion of Spherical and Cylindrical Cavities in Sand"
- Biggers, Sherrill Bost, Jr. (B.S., North Carolina State University; M.S., Duke University). *Civil Engineering*. Dissertation: "Dynamic Interactions of High Speed Tracked Air Cushion Vehicles with Their Guideways—A Parametric Study"
- Bowen, Clarence Edward (B.S., M.S., University of South Carolina). *Electrical Engineering*. Dissertation: "The Single-Ended Semiconductor Diode Mixer. A Mathematical Model which Includes the Effect of Circuit Resistance, Diode Capacitance, DC Bias and Circuit Filters"
- Brockwell, Charles Wilbur, Jr. (A.B., Wofford College; S.T.B., Harvard Divinity School). *Religion*. Dissertation: "Bishop Reginald Peacock and the Crisis and Challenge of the Laity in the English Church in the Fifteenth Century"
- Bucher, Richard Henry (A.B., University of Minnesota; M.A., Duke University). *Political Science*. Dissertation: "The Elementary and Secondary Education Act of 1965. A Study in Policy Change"
- Burke, Michael Edmund (A.B., College of the Holy Cross; M.A., Duke University). *History*. Dissertation: "The Royal College of San Carlos. Surgery and Spanish Medical Reform in the Late Eighteenth Century"
- Bushoven, Cornelius, III (A.B., Davidson College; M.A., Duke University). *Political Science*. Dissertation: "National Law and National Courts in the Political System of the Gold Coast and Ghana, 1874-1966"

- Byer, James Edwin (B.S., University of Chicago; M.A., Duke University). *English*. Dissertation: "The Literary Criticism of W. H. Auden: Theory and Practice"
- Cain, Marvin Fay (B.S.E.E., Washington State University; B.D., Lutheran Seminary; Th.M., Union Theological Seminary). *Religion*. Dissertation: "An Analysis of the Sources of Mark 1:1-3:35 and Parallels"
- Cain, Robert Jasper (A.B., Wake Forest College; M.A., Duke University). *History*. Dissertation: "Telegraph Cables in the British Empire, 1850-1900"
- Cochran, Clarke Edward (A.B., Brown University; M.A., Duke University). *Political Science*. Dissertation: "The Politics of Interest. The Eclipse of Community in Contemporary American Political Theory"
- Cole, Robert Reed (A.B., Drew University; M.A., Duke University). *Political Science*. Dissertation: "Gaulism and French Youth"
- Cone, Eddie Gay (B.A., M.A., Southern Methodist University). *English*. Dissertation: "The Free-Verse Controversy in American Magazines: 1912-1922"
- Conn, Neil Raymond (B.Ec., M.Ec., University of Sidney). *Economics*. Dissertation: "The Construction, Fitting and Application of Homogenous Production Functions in the Estimation of Disembodied Technical Progress"
- Coughlan, Heather Turner (B.A., Connecticut College; M.A., Duke University). *History*. Dissertation: "The Role of the Council of India 1898-1910"
- Cowart, Joseph Ralph (B.A., Millsaps College; M.A., Duke University). *Economics*. Dissertation: "The Economic Doctrines of Amasa Walker"
- Dorsey, Frank Colston (A.B., Brown University). *Mathematics*. Dissertation: "Response Surface Design: A Generalization of the Box-Draper Result and Some Consequences"
- Epifanio, Charles Edward (A.B., Lafayette College). *Zoology*. Dissertation: "The Effect of Dieldrin on the Larval Development of Two Species of Crabs"
- Evers, Jimmie William (A.B., Memphis State University; M.A., Duke University). *English*. Dissertation: "Some Implications of Chaucer's Use of Astrology in the *Canterbury Tales*"
- Fairchild, Charles Kenneth (A.B., American University). *Economics*. Dissertation: "Subsidized Worker Relocation in the United States"
- Foster, Elliott Orman, III (B.A., Ohio Wesleyan University; M.A., Syracuse University). *History*. Dissertation: "Social Comment and Social Reform Literature in Germany, 1520-1526"
- Fowler, Robert Herbert (B.A., M.A., Queens University). *History*. Dissertation: "Appeasement in the Mediterranean: A Study of Anglo-Italian Relations 1936-1969"
- Fraleigh, Jonathan David, Jr. (B.A., University of North Carolina; M.A., Duke University). *History*. Dissertation: "The Domestic Policy of Prince Hohenlohe as Chancellor of Germany, 1894-1900"
- Garrity, Thomas Francis (B.S., Holy Cross College; M.A., Duke University). *Sociology*. Dissertation: "Predicting Social Involvement and Morale Six Months After a Heart Attack"
- Graham, Doyle Gene (M.D., Duke University). *Pathology*. Dissertation: "Protein and Energy Metabolism of Mitochondria of the Common Meadow Mushroom (*Agaricus Bisporus*) in Extracellular Culture"
- Gray, James Louis (B.A., Abilene Christian College; M.A., Duke University). *English*. Dissertation: "The Development of the Early American Short Story to Washington Irving"
- Greenlaw, William Allen (B.A., University of California; B.D., Union Theological Seminary). *Religion*. Dissertation: "Reinhold Niebuhr as Theologian: A New Interpretation"
- Griffin, Brenda Walker (B.A., Vanderbilt University). *Chemistry*. Dissertation: "The Effect of Heisenberg Exchange on the Electron Spin Resonance Spectra of Some Triplet Exciton Spin Systems"
- Griffiths, Jonathan Straat (A.B., Gettysburg College; M.A., Duke University). *Chemistry*. Dissertation: "Alkylations and Self-Condensations of Certain N,N-Dialkyltoluamides. A New Method for the Preparation of 2-Isoxazolin-5-Ones. Condensations of Multiple Anions Formed by the Consecutive use of Different Bases"
- Gwinn, Diane Gwen (B.S., Northwestern University; M.Ed., Duke University). *Education*. Dissertation: "Verb Choices and Emotional Disturbance in Latency Age Children"
- Haas, Richard Dexter (B.A., Kalamazoo College). *Economics*. Dissertation: "A Portfolio Model of International Capital Flows"
- Hahn, Jeffrey William (B.A., University of Pennsylvania; M.A., Duke University). *Political Science*. Dissertation: "Political Socialization in the USSR: The Komsomol and the Educational System"
- Haines, Bruce Lee (B.A., M.A., University of California). *Botany*. Dissertation: "Plant Responses to Mineral Nutrient Accumulations in Refuse Dumps of a Leaf-Cutting Ant in Panama"
- Hall, Bowman Newton, II (A.B., Wabash College; M.A., Duke University). *Economics*. Dissertation: "A History and Critique of American Individualist Anarchists' Economic Theories"
- Ham, Donald Lee (B.A., William Jewell College; M.F., Duke University). *Forestry*. Dissertation: "The Biological Interactions of Sulfur Dioxide and *Schirrhia Acicola* in Loblolly Pine"

- Hammock, Thomas Everett, Jr. (B.A., University of Florida). *Psychology*. Dissertation: "The Effect of Barriers Upon the Attractiveness of Goal Objects"
- Hargrove, Richard John (A.B., Adelphi University; M.A., Duke University). *History*. Dissertation: "General John Burgoyne, 1722-1777"
- Harris, William Styron, Jr. (B.A., Wake Forest College; M.A., Duke University). *English*. Dissertation: "Allegorical Techniques in Charles Kingsley's Novels"
- Hartwell, John William (B.S., M.S., Duke University). *Electrical Engineering*. Dissertation: "A Procedure for Implementing the Fast Fourier Transform on Small Computers"
- Hawkins, Hal Kenneth. *Pathology*. Dissertation: "Lysosome Stability in Lethal Cell Injury"
- Hawks, Richard Lee (B.S., University of Richmond). *Chemistry*. Dissertation: "Sterochemical Studies of Mesembrenols and Related Alkaloids"
- Head, Emory Lee (B.A., M.A., University of Georgia). *English*. Dissertation: "A Study of *The Anti-Jacobin*; or, *Weekly Examiner*"
- Henrich, Joseph George (B.A., LaSalle College; M.A., Lehigh University; M.A., Duke University). *History*. Dissertation: "The Triumph of Ideology: The Jeffersonians and the Navy"
- Hoerz, Wolfram (Vorphysikum, Physikum, University of Tübingen). *Biochemistry*. Dissertation: "Initiation of Protein Synthesis in a Rabbit Reticulocyte Lysate System"
- Horton, Fred Lane, Jr. (A.B., University of North Carolina; B.D., Union Theological Seminary). *Religion*. Dissertation: "Melchizedek Tradition Through the First Five Centuries of the Christian Era and in the Epistle of the Hebrews"
- Huber, Donald Lester (A.B., Capital University; B.D., Evangelical Lutheran Theological Seminary). *Religion*. Dissertation: "The Controversy Over Pulpit and Altar Fellowship in the General Council of the Evangelical Lutheran Church 1866-1889"
- Huntley, Joyce Miller (B.A., Ohio Wesleyan University; M.A., Duke University). *Political Science*. Dissertation: "The Just War Theory Speaks to American Nuclear Policy"
- Ikai, Atsushi (B.S., M.S., Tokyo University). *Biochemistry*. Dissertation: "The Kinetics of the Unfolding and Refolding of Proteins"
- Jeager, Boi Jon (B.S., M.H.A., Duke University). *Political Science*. Dissertation: "Hospitals and the Federal Government: A Study of the Development and Outcomes of Public Policy"
- Kilham, Susan Soltau (B.S., Florida Presbyterian College). *Zoology*. Dissertation: "Deep Sea Bivalve Molluscs: Their Shell Morphology, Mineralogy and Geochemistry"
- Krabill, James Richard (B.A., Miami University; M.A., Duke University). *Mathematics*. Dissertation: "Generalized Dedekind-Rademacher Sums"
- Kramer, Thomas Rollin (B.A., Swarthmore College; M.A., Duke University). *Mathematics*. Dissertation: "Product Spaces and Countably Subparacompact Spaces"
- Kronenfeld, Jerrold Ernest (B.S., Duke University). *Physics*. Dissertation: "Two-Body Charged Sigma Production Near 1670 MEV"
- Ladner, Benjamin Mance (B.A., Baylor University; B.D., Southern Baptist Theological Seminary). *Religion*. Dissertation: "Elizabeth Sewell: Poetic Method as an Instrument of Thinking and Knowing"
- Lane, Malcolm Graham (B.S., Davidson College; M.A., Duke University). *Mathematics*. Dissertation: "The Numerical Solution of Improperly Posed Problems"
- Laube, Elzie Vandalia, Jr. (B.S., M.S., University of Wisconsin). *Botany*. Dissertation: "The Mucorales of Iceland with Notes on Some Ascomycetes"
- Lomranz, Jacob (B.A., Tel-Aviv University). *Psychology*. Dissertation: "Variants in Group Sensitivity Training and Encounter"
- Mancha, Philip Edward (B.A., Bridgewater College; M.A., Duke University). *History*. Dissertation: "Alfred Rosenberg: A Career Illustrative of Administrative Discord in the Third Reich, 1940-1943"
- Martz, Mary Reid (B.A., Georgetown University; M.A., University of North Carolina). *Political Science*. Dissertation: "Pacific Settlement of Controversies in the Inter-American System, 1948-1971"
- Matthews, Linda McCarter (B.A., Winthrop College; M.A., Duke University). *History*. Dissertation: "N. G. Gonzales, Southern Editor and Crusader, 1858-1903"
- McAllister, Ronald John (A.B., Merrimack College; M.A., Duke University). *Sociology*. Dissertation: "Neighborhood Integration and Prospective Residential Mobility. A Study of The Impact of Social Relationships on Moving and Staying Plans Among a National Sample of Metropolitan Area Residents"
- McDonald, Dennis Lesley (B.S., Valparaiso University). *Zoology*. Dissertation: "Some Aspects of the Use of Visual Cues in Directional Training and Homing of Pigeons"
- McIlwaine, Robert Shields (B.A., Harvard University; M.A., Duke University). *English*. Dissertation: "The Intellectual Farce of Bernard Shaw"

- Meeks, Thomas Jefferson (B.S., University of Pennsylvania). *Economics*. Dissertation: "A Neoclassical Theory of Monetary Equilibrium"
- Miao, Raymond Ming (B.A., Queens College). *Biochemistry*. Dissertation: "Entry of Deoxyribonucleic Acid During Transformation in *Diplococcus Pneumoniae*"
- Miller, David Edward (B.S., North Carolina State University; M.S., Duke University). *Electrical Engineering*. Dissertation: "An Electron Paramagnetic Resonance Study of Gadolinium Hexaboride"
- Monahan, John Sherrill (A.B., University of North Carolina). *Psychology*. Dissertation: "Extra-Retinal Compensation for Saccades: Its Magnitude and Timing"
- Moody, Walton Smith (A.B., Princeton University; M.A., Duke University). *History*. Dissertation: "The Introduction of Military Conscription in Napoleonic Europe, 1798-1812"
- Murphy, Donald Joseph, Jr. (B.S.C.E., M.S.C.E., Polytechnic Institute of Brooklyn). *Civil Engineering*. Dissertation: "Soils and Rocks: Composition, Confining Level and Strength"
- Nickell, James Minor (A.B., University of Kentucky; S.T.B., General Theological Seminary; M.A., Duke University). *Political Science*. Dissertation: "The Pursuit of Certainty in Modern Politics"
- Nutt, William Rodger (B.A., Ohio Wesleyan University; M.S., Duke University). *Chemistry*. Dissertation: "Reactions of Silicon-Nitrogen-Boron Compounds with Selected Hydrides"
- Odening, Walter Robert (B.S., San Diego State College; M.S., University of California). *Botany*. Dissertation: "The Effect of Decreasing Water Potential on Net CO₂ Exchange of Intact Woody Desert Shrubs"
- Papachristou, Gerald Christopher (B.A., Michigan State University; M.A., Duke University). *Political Science*. Dissertation: "The Politics of a Democratic Institution for Rural Development, The Case of *Panchayati Raj* in Rajasthan"
- Peek, Charles Wilburn, III (A.B., M.A., University of Georgia). *Sociology*. Dissertation: "Consensus on Drinking Norms and Strength of Sanctions in Male Collegiate Friendship Groups"
- Petersen, Richard Randolph (B.S., University of Washington). *Zoology*. Dissertation: "A Paleolimnological Study of Eutrophication of Lake Erie"
- Pietarinen, Ilmari (B.A., Helsinki University; M.A., Fletcher School of Law and Diplomacy). *Economics*. Dissertation: "On the Measurability of Structure in Economics"
- Polucci, Anthony Joseph (B.S., Massachusetts Institute of Technology). *Physics*. Dissertation: "Light Scattering in Helium-4"
- Raab, Jacob Lee (B.S., M.S., University of Chicago). *Zoology*. Dissertation: "The Effect of Running on Water Balance in the Kangaroo Rat"
- Ragan, Charles Ellis, III (B.S., The Citadel). *Physics*. Dissertation: "Study of Electromagnetic Transition in ³⁷Ar"
- Reidinger, Richard Barber (B.A., College of Wooster). *Economics*. Dissertation: "Canal Irrigation and Institutions in North India: Microstudy and Evaluation"
- Reiss, Keith Westcott (B.S., University of Virginia; M.A., Wake Forest University). *Physics*. Dissertation: "Electron Spin Resonance Studies of Radical Pairs in Carbazide and of Nucleoside Base Radicals in 5-Chlorouridine"
- Reuss, Martin Alan (B.A., Pennsylvania State University; M.A., Duke University). *History*. Dissertation: "Under Bismarck's Shadow: The German Foreign Ministry's Expansion of Influence 1888-1895"
- Reynolds, Michael Shane (B.A., Rice Institute; M.A., University of North Carolina). *English*. Dissertation: "A Historical Study of Hemingway's *A Farewell To Arms*"
- Rhee, Sun Whan (B.A., University of Foreign Studies; Diploma, Institute of Social Studies). *Economics*. Dissertation: "Welfare Economics and the Theory of Optimum Population. A Reformulation of Welfare Notion in Optimum Population"
- Richards, Bertrand Field (B.S., Eastern Illinois University; M.A., Indiana State University). *Education*. Dissertation: "An Application of Symbolic Logic to the Teaching of Composition"
- Romancier, Robert Marshall (B.S., University of Massachusetts; M.F., Yale University). *Forestry*. Dissertation: "Ecology of the Seedling Establishment of *Rhododendron Maximum* L. in the Southern Appalachians"
- Saide, Frederick (B.A., Adelphi University; M.A., Duke University). *History*. Dissertation: "The Dynamics of Appeasement: Britain, Germany, and North Central Europe October 1938-May 1939"
- Sanning, Kenneth John (B.A., Oberlin College; M.A., Duke University). *Chemistry*. Dissertation: "Metalation of 1-Substituted Naphthalenes with *n*-Butyllithium. Condensation with Electrophilic Compounds and Related Cyclizations"
- Saxena, Surendra Kumar (B.Sc., University of Rajputana; B.Sc., Aligarh University; M.S., Duke University). *Civil Engineering*. Dissertation: "Foundation Mats and Pavement Slabs Resting on an Elastic Foundation—Analyzed Through a Physical Model"

- Scott, Claudia DeVita (B.A., Mount Holyoke College; M.A., Duke University). *Economics*. Dissertation: "Forecasting Public Outlays: An Expenditure Model for New Haven, Connecticut"
- Sewell, David Oliver (B.A., M.A., University of New Zealand). *Economics*. Dissertation: "Training the Poor. A Benefit-Cost Analysis of Vocational Instruction in the United States Antipoverty Program"
- Shapiro, Kenneth Joel (B.A., Harvard College). *Psychology*. Dissertation: "The Concept of Introversion: Theoretical, Empirical, and Descriptive Considerations"
- Simmons, William Arthur (B.A., Harvard College; M.A., Duke University). *English*. Dissertation: "Prologue to a Criticism of Medieval Literature"
- Snare, John Langford (B.S.A., M.S.A., University of Georgia; M.A., Duke University). *Economics*. Dissertation: "An Economic Analysis of the Veterans' Education Program Below the College Level: 1945-1955"
- Stack, Michael Francis (B.A., M.A., University of Saskatchewan). *Philosophy*. Dissertation: "Hume and the External World"
- Su, Ching-Hsiang (B.S., M.S., Taiwan University). *Biochemistry*. Dissertation: "Regulation of Methionine Biosynthesis in *Escherichia Coli* K12"
- Sulkin, Stephen David (A.B., Miami University; M.A., Duke University). *Zoology*. Dissertation: "Behavioral Responses of the Development Stages of Two Xanthid Crabs to Light, Gravity, and Pressure Under Laboratory Conditions"
- Taylor, Charles Ronald (B.S., Ohio University; M.A., Duke University). *Chemistry*. Dissertation: "The Electronic Structure and Spectra of Tris (Octamethylpyrophosphoramide) Complexes of Nickel (II) Cobalt (II) and Copper (II)"
- Taylor, John (B.S., University of South Carolina). *Physics*. Dissertation: "Neutron Polarizations From (d, n) Reactions on ^{11}B , ^{24}Mg , ^{28}Si , and ^{40}Ca "
- Tobiessen, Peter Laws (B.A., Wesleyan University; M.S., Pennsylvania State University). *Botany*. Dissertation: "Temperature and Drought Stress Adaptations of Desert and Coastal Populations of *Isomeris Arborea*"
- Tucker, Robert Keith (B.A., University of California; M.A., Humbolt State College). *Zoology*. Dissertation: "Developmental and Environmental Effects on Free Amino Acids in Larvae of the Stone Crab, *Menippe Mercenaria* (SAY)"
- Turner, Wesley Barry (B.A., M.A., University of Toronto). *History*. Dissertation: "Colonial Self-Government and the Colonial Agency: Changing Concepts of Permanent Canadian Representation in London, 1848-1880"
- Van Alstyne, Carol (B.A., University of California; M.A., Stanford University; M.A., Yale University). *Economics*. Dissertation: "The Economics and Politics of Low Income Housing"
- Vance, Terry Goldman (B.A., University of California). *Psychology*. Dissertation: "Pretense Behavior and Change: Effects of Responsibility and Irresponsibility on Change Following Positive and Negative Discrepant Role-Play"
- Vasicko, Sally Jo (B.A., University of Puget Sound). *Political Science*. Dissertation: "Double Jeopardy in the Federal Courts, 1953-1969: An Impact Study of Warren Court Decisions"
- Vaughn, Karen Iversen (B.A., Queens College; M.A., Duke University). *Economics*. Dissertation: "An Examination of the Economic Theories of John Locke"
- Wagner, Frederick Reece (A.B., M.A., Duke University). *English*. Dissertation: "Travel Writing about the British Isles and France in Selected American Literary Periodicals, 1865-1890"
- Wallace, Bernie Alvin, Jr. (B.S., Tulane University). *Physics*. Dissertation: "A Study of He^3 and $\text{He}^3\text{-He}^4$ Mixtures Near the Liquid-Vapor Critical Point"
- Ward, Lawrence McCue (A.B., Harvard University). *Psychology*. Dissertation: "Some Psychophysical Properties of Category Judgments and Magnitude Estimations"
- Ware, Carolyn Bogardus (B.A., Western Reserve University; M.Ed., State University of New York at Buffalo). *Psychology*. Dissertation: "The Role of Striate Cortex in the Tree Shrew (*Tupaia Glis*) in Successive Visual Discrimination"
- Weaver, Richard Edwin, Jr. (B.S., Millersville State College; M.A., Duke University). *Botany*. Dissertation: "A Revision of the Neotropical Genus *Lisianthus* (Gentianaceae)"
- Webb, Geoffrey Roderick (B.A., University of South Florida; M.A., Duke University). *Mathematics*. Dissertation: "The Functional Central Limit Theorem for Non-Stationary Mixing Sequences of Random Variables"
- White-Stevens, Rodric Harold (B.Sc., Massachusetts Institute of Technology). *Biochemistry*. Dissertation: "Studies of a Flavoprotein, Salicylate Hydroxylase"
- Wiley, David Neeld (B.A., College of Wooster; B.D., McCormick Theological Seminary). *Religion*. Dissertation: "Calvin's Doctrine of Predestination: His Principal Soteriological and Polemical Doctrine"
- Wilkinson, Thomas George (B.S., M.F., Duke University). *Forestry*. Dissertation: "Studies on the Effects of Ozone on Photosynthetic Processes in *Pinus Strobus*"

Williams, Henry Gordon (B.S., Wake Forest University; M.A., Duke University). *Mathematics*. Dissertation: "An Extension of the Simon Newcomb Problem"

Wright, George Wayne (B.S., Hampden-Sydney College; M.A., Duke University). *Chemistry*. Dissertation: "Stereochemistry and Rearrangements of Dicyclopentadiene Derivatives"

Wyatt, Robert Harris, Jr. (B.S., M.S., Duke University). *Electrical Engineering*. Dissertation: "A Study in the Measurement and Quantification of Finger Tremors"

Zwick, Peter Ronald (B.A., Grinnell College; M.A., Duke University). *Political Science*. Dissertation: "An Aggregate Biographical Analysis of the Soviet Political Elite"

ADVANCED DEGREES CONFERRED SEPTEMBER 1, 1971

Master of Arts

Afghahi, Mohammad H.
 Agnew, Elizabeth Hall
 Andersen, Andrea Julia
 Beattie, Daniel John
 Blank, Frederick Michael
 Bostic, William Montgomery, Jr.
 Bouska, Amy Susan
 Brown, Robert Edward
 Chang, Chun-Tsan
 Chang, Kuk Won
 Chatfield, Carole Osterink
 Christenson, Anne Marie
 Fiscus, Susan Adams
 Fitzgerald, Rosalie Burrows
 Fritz, Steven J.
 Hallahan, Huston Diehl
 Haulk, Charles J.
 Hawley, Clifford B., III
 Herr, Richard Allen
 Hobbs, Peter Burke
 Hutton, James David
 Jones, Allen Keith
 Komson, Richard Charles

Kramer, Anne Welsh
 Lee, James Sanford
 Lin, Chia Sheng
 Loveland, Franklin Olds, III
 Madden, Janice Fanning
 Mast, William Gregory
 Mishler, William Thomas Earle, II
 Mohl, Paula Joan Caplan
 Moseley, Elizabeth Hart
 Nathans, Gene Ronald
 Pedigo, Robert Daniel, Jr.
 Purdy, Joyce Elaine
 Sayre, Sandra Mitchell
 Schulz, Barbara Jean
 Schwartz, Eileen E.
 Sinks, John Douglas
 Somers, Joseph Henry
 Tarpe, Edgar Alan
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Master of Arts in Teaching

Arman, Darrell Joseph
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Hewitt, Darrell Dean
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 Hughes, Edgar Reid
 Johnson, Joseph H., Jr.
 Johnson, Suzanne Clark
 Jurgelsky, Annette Lanquist
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 Kopelman, Estelle
 Lipke, Mary Ann
 Lynch, Lila Reswick
 Matthews, Kimberly Ann
 McCoy, James Benjamin, III
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 McNairy, Leigh Harvey
 Pace, Susan Margaret
 Pipkin, Velma Lacey
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Master of Education

Atkins, Alice Evans
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Master of Science

Harper, John Preston, Jr.
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Doctor of Education

Ball, John Richard (B.A., Wake Forest University; B.D., Southeastern Baptist Theological Seminary; M.S.W., University of North Carolina). *Education*. Dissertation: "Allied Health Education: Its Development and Potential Role in Health and Social Change"
Byrd, Charles Henderson (B.A., M.A., East Carolina University). *Education*. Dissertation: "A Study to Determine the Feasibility of Establishing a Comprehensive Community College in a Selected Four-County Area in Eastern North Carolina"
Jewell, Richard McNeal (B.S., M.Ed., Virginia Polytechnic Institute). *Education*. Dissertation: "The Relationship of Selected Fiscally Related Variables and Pupil Achievement"
Lanier, Ruby Jean (B.A., Lenior Rhyne College; M.A., Appalachian State University). *Education*. Dissertation: "Blanford Barnard Dougherty: Mountain Educator"
Pruitt, Kenneth Wayne (B.A., Elon College; M.A., East Carolina University). *Education*. Dissertation: "A Systems Approach to the Teaching of Language at the Tenth Grade Level: A Program Based on Behavioral Objectives"
Washburn, Barbara Pfohl (B.S., M.A.T., Duke University). *Education*. Dissertation: "The Learning Resources Center in an Institution Dedicated to Student Learning: A Proposal for the Two Year College"

Doctor of Philosophy

Ames, John Turner, Jr. (B.A., University of Mississippi; B.D., Union Theological Seminary). *Religion*. Dissertation: "James Everitt Clarke: A Cumberland Liberal and the Social and Theological Development of American Presbyterianism, 1904-1934"
Baker, Chadwick Murray, III (B.S., Christian Brothers College). *Biomedical Engineering*. Dissertation: "Inverse Electrocardiography: Time Dependent Solutions"
Black, William Priestley (B.A., College of William and Mary; M.A., Duke University). *English*. Dissertation: "The Virginia Gazette, 1766-1774: Beginnings of an Indigenous Literature"
Blasecki, John Walter, Jr. (B.S., B.Pharm., Rutgers University). *Microbiology*. Dissertation: "Immunological Studies on SV-40 Membrane-Associated Antigens"
Bouygues, Claude Pierre (Diplome D'Etudes Superieures, University of Paris Sorbonne). *Romance Languages*. Dissertation: "Imagination De L'eau Dans Les Premiers Romans De Giono: Etude Elementale"
Boyd, Monica (B.A., University of Chicago; M.A., Duke University). *Sociology*. Dissertation: "Occupational Mobility and Fertility in Urban Latin America"
Brandstadter, Michael (B.A., Adelphi University; M.A., Duke University). *History*. Dissertation: "Paul Reynaud and the Third French Republic, 1919-1939: French Political Conservatism in the Interwar Years"
Bromley, David Grover (B.A., Colby College; M.A., Duke University). *Sociology*. Dissertation: "The Significance of the Annexation Process in Metropolitan Areas of the United States: 1840-1960"
Buchanan, John George (B.A., Roosevelt University). *History*. Dissertation: "The Pursuit of Happiness: A Study of the Rev. Dr. Samuel Cooper, 1725-1783"

- Buehler, John Nicholas (B.A., Wittenberg University). *Psychology*. Dissertation: "The Physical Luminances in the Stimulus Display and the Phenomenon of Simultaneous Brightness Contrast"
- Campbell, Henry Flud (B.S., University of Richmond). *Chemistry*. Dissertation: "Chemical and Biosynthetic Studies of the Mesembrine Alkaloids"
- Chabot, Brian Frank (B.S., College of William and Mary). *Botany*. Dissertation: "Origins and Ecology of the Sierran Alpine Flora and Vegetation"
- Chow, Ron-Yaw (B.S., M.S., National Taiwan University). *Electrical Engineering*. Dissertation: "The Statistical Analysis and Algorithm Implementation of an Adaptive Bit Synchronizer"
- Clarke, Harold Dowler (B.A., M.A., University of Western Ontario). *Political Science*. Dissertation: "Political Socialization, Political Recruitment and Party Careers: An Exploratory Study"
- Clements, Barbara Evans (B.A., Westhampton University; M.A., Duke University). *History*. Dissertation: "The Revolution and the Revolutionary: Aleksandra Mikhailovna Kollontai, 1917-23"
- Corless, Joseph Michael (B.S., Georgetown University). *Anatomy*. Dissertation: "X-Ray Diffraction Studies on Retinal Rod Photoreceptor Membrane Structure"
- Costello, Joseph Martin, III (B.S., George Washington University; M.A., Duke University). *Chemistry*. Dissertation: "X-Ray Diffraction Studies on the Smectic Mesophase"
- Crocker, Byron Pennington, Jr. (B.S., University of Pittsburgh). *Pathology*. Dissertation: "Cell Injury and Cell Death: Structural and Functional Studies on the Pathogenesis of Ischemic Injury Based on an *In Vitro* Model"
- Crowder, Norville David (B.A., Vanderbilt University; M.A., Duke University). *Sociology*. Dissertation: "A Marxist's Critique of Duncan's Stratification Research"
- Curry, Lawrence Hopkins, Jr. (B.S., M.S., University of South Carolina). *History*. Dissertation: "Southern Senators and Their Roll-Call Votes in Congress, 1941-1944"
- Dabbagh, Rassool Abdulla (B.V.M., University of Bagdad; M.A., Duke University). *Microbiology*. Dissertation: "Effect of Temperature on Saprophytic Species of Genus *Cryptococcus*"
- Daniels, Charles Andrew (B.S., University of Kentucky; M.D., Vanderbilt University). *Pathology*. Dissertation: "The Inactivation of Herpes Simplex Virus with Bovine Trypsin"
- Davidson, Darwin Ervin (B.S., Oregon State University; M.S., University of Wyoming). *Botany*. Dissertation: "The Effect of Salinity on a Marine and a Freshwater Ascomycete"
- Dueck, Abram Jacob (B.A., University of British Columbia; B.D., Goshen College Biblical Seminary; Th.D., Mennonite Bretheran Bible College). *Religion*. Dissertation: "Religion and Politics in the Reformation: Philipp of Hesse and the Consolidation and Expansion of German Protestantism, 1531-1536"
- Elder, Robert Ellsworth, Jr. (B.A., Colgate University; M.A., Duke University). *Political Science*. Dissertation: "Development Administration in a North Indian State: The Family Planning Program in Uttar Pradesh"
- Engel, John Francis (B.S., University of Cincinnati). *Chemistry*. Dissertation: "Chemistry of Phospholes and Related Systems"
- Fletcher, Frederick James (B.A., University of British Columbia; M.A., Duke University). *Political Science*. Dissertation: "Administrative Reform and Administrative Development in Two Nigerian Regions"
- Fortney, Judith Astrid (B.Sc., University of London; M.S., University of Wisconsin). *Sociology*. Dissertation: "Role Preferences and Fertility: An Exploration of Motivations for Childbearing"
- Freund, Robert Elmer (B.S., University of Pittsburgh; M.A., University of Miami). *Economics*. Dissertation: "Competition and Innovation in the Transistor Industry"
- Gallop, Marshall Aubrey, Jr. (B.S.E.E., M.S., Duke University). *Electrical Engineering*. Dissertation: "Adaptive Optimum Array Detectors"
- Ganung, Cynthia Ann (B.A., Swarthmore College). *Psychology*. Dissertation: "Motivational Determinants of Verbal Learning in Older Women"
- Graham, Stephen Anthony (B.A., Davidson College; M.A., Duke University). *Political Science*. Dissertation: "The Phenomenology of Edmund Husserl and the Study of Politics and Society"
- Gravetter, Frederick J. (B.S., Massachusetts Institute of Technology). *Psychology*. Dissertation: "Stimulus Range as a Frame of Reference for Judgment"
- Gregg, William Pemberton, Jr. (B.A., University of Pennsylvania). *Botany*. Dissertation: "Ecology of the Annual Grass *Setaria Lutescens* on Oldfields of the Pennsylvania Piedmont"
- Gutman, Stanley Theodore (B.A., Hamilton College; M.A., Duke University). *English*. Dissertation: "Mankind in Barbary: The Individual and Society in the Novels of Norman Mailer"

- Hass, Paula Hollerbach (B.A., Cornell University; M.A., Duke University). *Sociology*. Dissertation: "Maternal Employment and Fertility in Metropolitan Latin America"
- Hecky, Robert Eugene (B.S., Kent State University). *Zoology*. Dissertation: "The Paleolimnology of the Alkaline, Saline Lakes on the Mt. Meru Lahar"
- Hitchcock, Walter Bertram (B.A., Auburn University; M.A., University of Oregon). *English*. Dissertation: "The Achievement of the Forlorn Hope: Pedagogical Portraits in American Literature, 1820-1871"
- Hudson, Richard Howard (B.S., University of North Carolina; M.A., Duke University). *Mathematics*. Dissertation: "On the Distribution of Quadratic Residues and Non-Residues"
- Jaffe, Charles J. (B.A., Johns Hopkins University). *Pathology*. Dissertation: "Studies of Macrophage Endocytosis and Migration"
- Johnson, Ralph Edward (B.S., University of Santa Clara; M.A., Duke University). *Mathematics*. Dissertation: "Trigonometric Approximation Methods with Delta Functionals"
- Kellogg, Charles Warner (B.S., M.S., University of Massachusetts). *Zoology*. Dissertation: "The Role of Gastropod Shells in Determining the Patterns of Distribution and Abundance in Hermit Crabs"
- King, Charles Conaway (B.A., Guilford College; M.A., Duke University). *Economics*. Dissertation: "Analysis of Economic Factors Influencing Levels of Unionization with Special Reference to the South"
- Knapp, Richard Frederic (B.A., Stetson University; M.A., Duke University). *History*. Dissertation: "Play for America: The National Recreation Association, 1906-1950"
- Knick, Earl Bernard, Jr. (B.S., Virginia Polytechnic Institute; M.S., Purdue University). *Electrical Engineering*. Dissertation: "Sequentially Selected Class Descriptors for Pattern Recognition"
- Krey, Lewis Charles (B.A., Brown University). *Physiology*. Dissertation: "Estrogen Administration Early in the Rat Estrous Cycle: Feedback Effects on Gonadotrophin Secretion"
- Kurtz, David Corey (B.S., Purdue University; M.S., Massachusetts Institute of Technology; M.A., Wake Forest University). *Mathematics*. Dissertation: "Concavity and Asymptotic Properties of Arrays of Numbers"
- Lake, Charles Raymond (B.S., M.S., Tulane University). *Physiology*. Dissertation: "Tyrosine Metabolism and the Pathway to the Oothecal Scloerotization Agents in *Periplaneta Americana*"
- Lucansky, Terry Wayne (B.S., University of South Carolina). *Botany*. Dissertation: "Comparative Studies of the Nodal and Vascular Anatomy in the Neotropical Cyatheaceae"
- Marzluff, William Frank, Jr. (B.A., Harvard College). *Biochemistry*. Dissertation: "A Study of the Species Specificity of Histone Acetylation"
- McAlpin, Bruce Wilcox (B.S., Duquesne University; M.A., Duke University). *Botany*. Dissertation: "Shoot Organization in the Filicales: The Promeristem"
- McMillan, Paul Nathan (B.S., Marshall University). *Microbiology*. Dissertation: "Isolation and Characterization of Three Isopycnic Forms of Myelin from Whole Brain Homogenates: Zonal Centrifuge Profiles, Stability in Isotonic Ficoll-Sucrose, Chemical Analysis, Persistence among Vertebrate Species, and Immunological Distinction from Purified Synaptosomes and Mitochondria"
- Meeks, Merrill Douglas (B.A., Southwestern at Memphis; B.D., Duke University). *Religion*. Dissertation: "Origins of the Theology of Hope"
- Miao, Greta Gustafson (B.A., Queen's College; M.A., Duke University). *Sociology*. Dissertation: "The Effects of Individual Variation on Socialization in a School of Nursing"
- Moose, Richard Lee (B.S.E.E. Ohio University; M.S.E.E. University of California). *Electrical Engineering*. Dissertation: "An Adaptive Estimator with Learning for a Plant Containing Semi-Markovian Switching Parameters"
- Morton, John Edward (B.A., University of South Florida; M.A., Duke University). *Economics*. Dissertation: "Solving Stochastic Simulation Models of the Firm: The Use of Response Surface Methodology"
- Patrick, Clifford Howard (B.A., Clemson University; M.A., Duke University). *Economics*. Dissertation: "Some Aspects of the Demand for Children in the United States: An Economic Analysis of Household Reproductive Decisions"
- Polhemus, James Higbie (B.S., University of Tennessee; M.A., University of Virginia). *Political Science*. Dissertation: "The Organization of African Unity and Intrasystem Conflict Management: 1963-1968"
- Pollock, Elisabeth Marie (B.S., M.S., University of Western Ontario). *Pathology*. Dissertation: "Studies on the Migration Properties of Macrophages"
- Porter, James Norman (B.S., Indiana State College; M.A., Duke University). *Sociology*. Dissertation: "On Making It: Race, Socialization, and Mobility in Educational and Early Occupational Attainment"

- Prochnow, Neal Harrold (B.S., Wisconsin State University; M.S., Vanderbilt University). *Physics*. Dissertation: "A High Resolution Study of Proton Resonances in ^{47}V , ^{49}V and ^{51}V "
- Reber, James Calvin (B.A., Indiana Central College; M.A., Duke University). *Mathematics*. Dissertation: "Locally Convex Riesz Spaces"
- Rives, Janet McMillan (B.A., University of Arizona; M.A., Duke University). *Economics*. Dissertation: "The International Market for Higher Education: An Economic Analysis with Special Reference to the United States"
- Rives, Norfleet Williamson, Jr. (B.A., University of Missouri; M.A., Duke University). *Economics*. Dissertation: "The Family Formation Process in Developing Countries: A Computer Simulation"
- Robinson, David Edgar (B.A., Hamilton College; M.A., Duke University). *English*. Dissertation: "Unaccommodated Man: The Estranged World in Contemporary American Fiction"
- Rosenson, Leon Mendel (B.A., Duke University; M.B.A., Harvard College; B.A. University of California). *Zoology*. Dissertation: "Social Behavior of the Greater Bushbaby"
- Roy, Ramond Clyde (B.Sc., University of Pennsylvania; M.A., Duke University). *Chemistry*. Dissertation: "Electronic Structure of Transition Metal Compounds. I. Tetragonal Copper (II) Complexes. II. Tris (α -Diimine) Nickel (II) Complexes"
- Schmidtke, James Alan (B.A., Central Methodist College; M.A., Duke University). *History*. Dissertation: "Adam Easton's Defense of St. Birgitta from Bodleian M.S. Hamilton 7 Oxford University"
- Shelburne, John Daniel (B.A., University of North Carolina). *Pathology*. Dissertation: "Studies on Autophagocytosis"
- Shimada, Yutaka (B.E., M.E., Tohoku University). *Electrical Engineering*. Dissertation: "Magnetic Properties of Rare Earth-Indium Compounds"
- Singleton, David George (B.S.M.E., Purdue University; M.A.T., Duke University). *Education*. Dissertation: "The Impact of an In-Service Training Program in Modern Mathematics on Teachers' Knowledge of Modern Math Concepts, Teachers' Attitude toward Mathematics, and Pupils' Performance on Standardized Achievement Tests"
- Stermer, Robert Louis, Jr. (B.E.E., M.E.E., University of Virginia). *Electrical Engineering*. Dissertation: "The Preparation and Evaluation of Strain Anneal Grown Gadolinium Crystals"
- Stokes, Randall Goodson (B.A., San Diego State College). *Sociology*. Dissertation: "The Afrikaner Entrepreneur: Social Origins, Psychological Dispositions, and Values"
- Tang, Hai-Chuan (B.S., M.S., Cheng Kung University). *Civil Engineering*. Dissertation: "Initial Viscoplastic Yielding at Running Cracks in Brittle Fracture"
- Temple, Virginia Ellen (B.A., Randolph-Macon Woman's College; M.A., Duke University). *Economics*. Dissertation: "A Computer Simulation Game for State Governments"
- Turner, Stephen Roy (B.S., University of Rochester). *Chemistry*. Dissertation: "Physical Chemical Studies of Native and Porphyrin Cytochromes c"
- Warner, Stanley Eugene, Jr. (B.A., Emory University; M.A., University of Florida). *Economics*. Dissertation: "The Finance of Publicly-Owned Terminal Airports"
- Wells, David Taliaferro (B.A., Duke University). *Psychology*. Dissertation: "Voluntary Control of Heart Rate"
- Williams, Gary Lee (B.A., Centre College; M.A., Duke University). *History*. Dissertation: "James and Joshua Speed: Lincoln's Kentucky Friends"
- Wilson, Wilkie A., Jr. (B.S., Louisiana State University). *Biomedical Engineering*. Dissertation: "A Voltage Clamp Analysis of Slow Waves and Prolonged Synaptic Potentials in Bursting Neurons"
- Wiser, James Louis (B.A., Notre Dame University; M.A., Duke University). *Political Science*. Dissertation: "The Varieties of Political Knowledge: An Application of the Philosophy of *Existenz*"
- Worchel, Stephen (B.A., University of Texas). *Psychology*. Dissertation: "The Effect of Simple Frustration, Violated Expectancy, and Reactance on the Instigation to Aggression"

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Carolyn H. Vaughan:

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All other photographs by the University photographers Thad Sparks and Jim Wallace.



MAP OF DUKE UNIVERSITY

East Campus

- | | | | |
|---|-------------------------|----|----------------------|
| A | Baldwin Auditorium | O | Pegram House |
| B | Bassett House | P | Duke Press |
| C | Brown House | Q | Infirmary |
| D | Union Building | R | Ark |
| E | Faculty Apartments | S | Crowell Building |
| F | Art Museum, Geology | T | Epworth Inn |
| G | Aycock House | U | Gilbert-Addoms House |
| H | East Duke Building | V | Southgate Hall |
| I | West Duke Building | W | Campus Center |
| J | Jarvis House | X | Woman's College |
| K | Carr Building | | Gymnasium |
| L | Giles House | Y | Asbury Building |
| M | Woman's College Library | Z | Bivins Building |
| N | Alspaugh House | AA | Art Building |
| | | BB | Branson Building |



West Campus

- | | | | | | | | |
|---|-------------------------------------|---|---------------------------------------|---|----------------------------------|----|--|
| A | Duke Chapel | H | Hospital Main Entrance | O | Craven Quadrangle | V | Card Gymnasium |
| B | Divinity School | I | Gerontology, D & T, Clinical Research | P | Wannamaker Hall | W | Indoor Stadium |
| C | Gray Building | J | Duke Hospital | Q | Crowell Quadrangle | X | School of Law |
| D | Perkins Library | K | Sociology, Psychology | R | Clock Tower Court | Y | Gross Chemical Laboratory |
| E | Language Center | L | Social Sciences | S | Kilgo Quadrangle | Z | Biological Sciences |
| F | Old Chemistry Building | M | Allen Building | T | Union Building | AA | Plant Environment Laboratory |
| G | Davison Building School of Medicine | N | Few Quadrangle | U | Flowers Building Page Auditorium | BB | Physics Building |
| | | | | | | CC | Nuclear Laboratory |
| | | | | | | DD | School of Engineering |
| | | | | | | EE | Army Research |
| | | | | | | FF | Medical Center Research Buildings |
| | | | | | | GG | Nanaline H. Duke Medical Sciences Building |
| | | | | | | HH | Warehouse, Shop |
| | | | | | | II | Bell Building |
| | | | | | | JJ | Hanes House |
| | | | | | | | School of Nursing |
| | | | | | | KK | Hanes House Annex |
| | | | | | | LL | Pickens Rehabilitation Center |
| | | | | | | MM | Graduate Center |
| | | | | | | NN | Alumni House |
| | | | | | | OO | Commonwealth-Studies Center |
| | | | | | | PP | Personnel Office |
| | | | | | | QQ | International House |
| | | | | | | RR | Personnel Office |
| | | | | | | SS | Education Improvement Program |
| | | | | | | TT | A Better Chance Program International Studies Center |
| | | | | | | UU | Campus Stores Office |
| | | | | | | VV | Office of Institutional Advancement |
| | | | | | | VW | Information Services Visitors Bureau |
| | | | | | | XX | Admissions Office |
| | | | | | | YY | Edens Quadrangle |
| | | | | | | ZZ | Wade Stadium |







Bulletin of Duke University 1972-1973

Undergraduate Instruction



Bulletin of Duke University

Undergraduate Instruction

Trinity College

The Woman's College

The School of Engineering

The School of Nursing

1972-1973

Durham, North Carolina 1972

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March, 1972

Number 8

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University Calendar—1972-73

1972

August

- 31 Thursday—Orientation begins: assemblies for all new students entering Trinity College, The Woman's College, the School of Engineering, and the School of Nursing

September

- 1 Friday—Registration and matriculation of all new and nonpreregistered students in the Graduate School; Trinity College, The Woman's College, the School of Engineering, and the School of Nursing who have not preregistered
2 Saturday—Final registration of preregistered students
5 Tuesday, 9:00 a.m.—Fall semester classes begin

October

- 20 Friday—Last day for reporting midsemester grades
30-11/2 Monday-Thursday—Preregistration for Spring, 1973

November

- 21 Tuesday, 6:00 p.m.—Thanksgiving recess begins
27 Monday, 9:00 a.m.—Classes are resumed

December

- 10 Sunday—Founders' Day
11 Monday, 6:00 p.m.—Fall semester classes end (undergraduate)
12-13 Tuesday-Wednesday—Reading Period
14 Thursday—Final examinations begin
21 Thursday—Final examinations end

1973

January

- 11 Thursday—Orientation begins: assemblies for all new students entering Trinity College, The Woman's College, the School of Engineering, and the School of Nursing
13 Saturday—Final Registration of preregistered students
15 Monday, 9:00 a.m.—Spring semester classes begin

February

- 26 Monday—Last day for reporting midsemester grades

March

- 16 Friday, 6:00 p.m.—Spring recess begins
26 Monday, 9:00 a.m.—Classes are resumed

April

- 3-6 Tuesday-Friday—Preregistration for fall and summer, 1973
27 Friday, 6:00 p.m.—Spring semester classes end (undergraduate)
28-30 Saturday-Monday—Reading period (undergraduate)

May

- 1 Tuesday—Final examinations begin
8 Tuesday—Final examinations end
12 Saturday—Commencement begins
13 Sunday—Commencement: Baccalaureate Service and Graduation Exercises

University Administration

General Administration

Terry Sanford, J.D., LL.D., D.H., L.H.D., D.P.A., *President*
John O. Blackburn, Ph.D., *Chancellor*
Frederic N. Cleaveland, Ph.D., *Provost*
Charles B. Huestis, *Vice President for Business and Finance*
William G. Anlyan, M.D., *Vice President for Health Affairs*
Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*
Gerhard Chester Henricksen, M.A., C.P.A., *Vice President and Treasurer*
Harold Lewis, Ph.D., *Vice Provost and Dean of the Faculty*
John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*
James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*
*Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*
Thomas F. Keller, Ph.D., *Vice Provost*
Benjamin Edward Powell, Ph.D., *Librarian*
J. Peyton Fuller, A.B., *Controller*
Clark R. Cahow, Ph.D., *University Registrar*
Rufus H. Powell, LL.B., *Secretary of the University*
Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Assistant Treasurer*
Victor A. Bubas, B.S., *Assistant to the President*
A. Kenneth Pye, LL.M., *University Counsel*

*On leave through August 31, 1972.

Undergraduate Administration

James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*
Hugh M. Hall, Ph.D., *Assistant Provost and Dean of Trinity College*
Juanita M. Kreps, Ph.D., *Assistant Provost and Dean of The Woman's College*
William J. Griffith, A.B., *Assistant Provost and Dean of Student Affairs*
Harold G. Wallace, A.B., *Student Adviser, Assistant to the Dean of Undergraduate Education*

Trinity College

Hugh M. Hall, Ph.D., *Dean*
Gerald L. Wilson, B.D., M.A., *Assistant Dean*
Alan W. Jenks, Th.D., *Dean of Freshmen and Assistant Dean*
Ellen Wittig, Ph.D., *Assistant Dean*
Leroy P. Smith, M.S., *Assistant Dean*
James C. Little, Diploma, A. and Div., B.D., *Assistant Dean*
Stephen C. Frederick, A.B., B.D., *Assistant Dean*
Richard L. Cox, B.D., Th.M., *Dean of Undergraduate Men*
Allen D. Feezor, A.B., *Assistant Dean of Undergraduate Men*

The Woman's College

Juanita M. Kreps, Ph.D., *Dean*
Jane Philpott, Ph.D., *Dean of Undergraduate Instruction*
Virginia S. Bryan, Ph.D., *Assistant Dean*
Elizabeth Studley Nathans, Ph.D., *Assistant Dean of Undergraduate Instruction*
Barney L. Jones, Ph.D., *Assistant Dean*
Paula R. Phillips, A.B., *Dean of Women*
Lillian A. Lee, M.S.Ed., *Assistant Dean of Undergraduate Women*
Shirley Hanks, A.B., *Assistant to the Dean*
Jean F. O'Barr, Ph.D., *Director of Continuing Education*

The School of Engineering

George W. Pearsall, Sc.D., *Dean*

Otto Meier, Jr., Ph.D., *Associate Dean for Undergraduate Study*

The School of Nursing

Ruby L. Wilson, R.N., Ed.D., *Dean*

Ella E. Shore, M.R.E., M.A., *Dean of Student Affairs*

Martha Nan Hayes, *Assistant to the Dean*

Undergraduate Admissions

Robert H. Ballantyne, Ed.D., *Director Undergraduate Admissions*

Everett B. Weatherspoon, A.B., *Director, Undergraduate Financial Aid*

Boards of Visitors, Undergraduate Colleges and Schools

The Woman's College

Leona Baumgartner, *Executive Director, Tri-State Regional Medical Program and Visiting Professor of Social Medicine, Harvard Medical School*

Germaine Bree, *Director, Institute for Research in the Humanities, University of Wisconsin*

Blanche Barringer Brian, *Alumna and Trustee of the University*

Louise Jones Brown, *Alumna*

Mary I. Bunting, *President, Radcliffe College*

Wilhelmina Reubens Cooke, *Alumna and student at the University of Michigan School of Law*

Eleanor Lansing Dulles, *Retired diplomat, former officer of the Departments of State and Commerce, now professor at Georgetown University*

Virginia Duncan Edwards, *Durham Community Leader*

Alice F. Emerson, *Dean of Students, University of Pennsylvania*

Sue Ellen Estroff, *Student and Chairman of the Women's Residence Council*

John Frank, *Alumnus and President of the North Carolina Granite Corporation*

Elizabeth Hanford, *Alumna and Deputy Director, Office of Consumer Affairs*

Nancy Hanks, *Alumna and Chairman, National Council on the Arts*

E. Wilson Lyon, *Former President, Pomona College*

Elisabeth Luce Moore, *Chairman, Board of the State University of New York*

Anne Pannell Taylor, *Former President, Sweet Briar College*

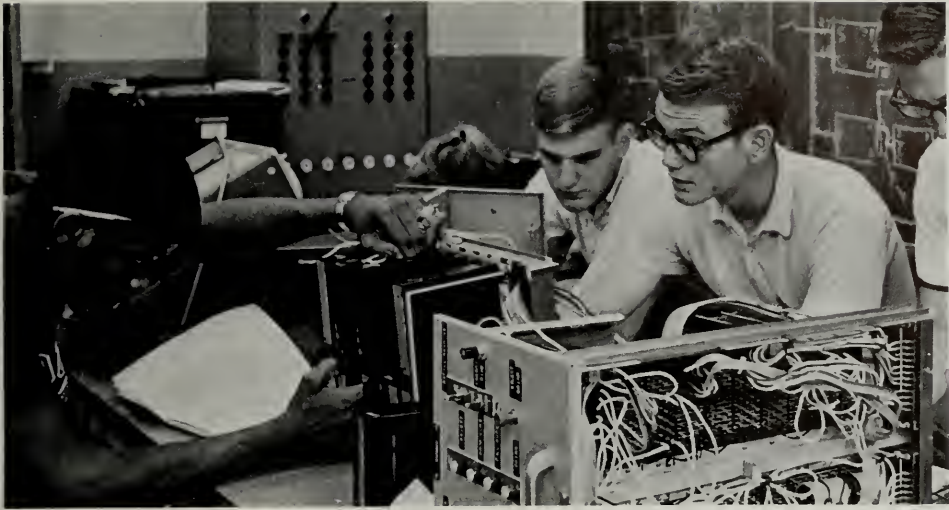
Martha E. Peterson, *President, Barnard College*

William Laurens Pressly, *President, Westminster Schools*

Mary D.B.T. Semans, *Alumna and Trustee of Duke University and the Duke Endowment*

Walter M. Upchurch, Jr., *Former Senior Vice-President, Shell Companies Foundation*



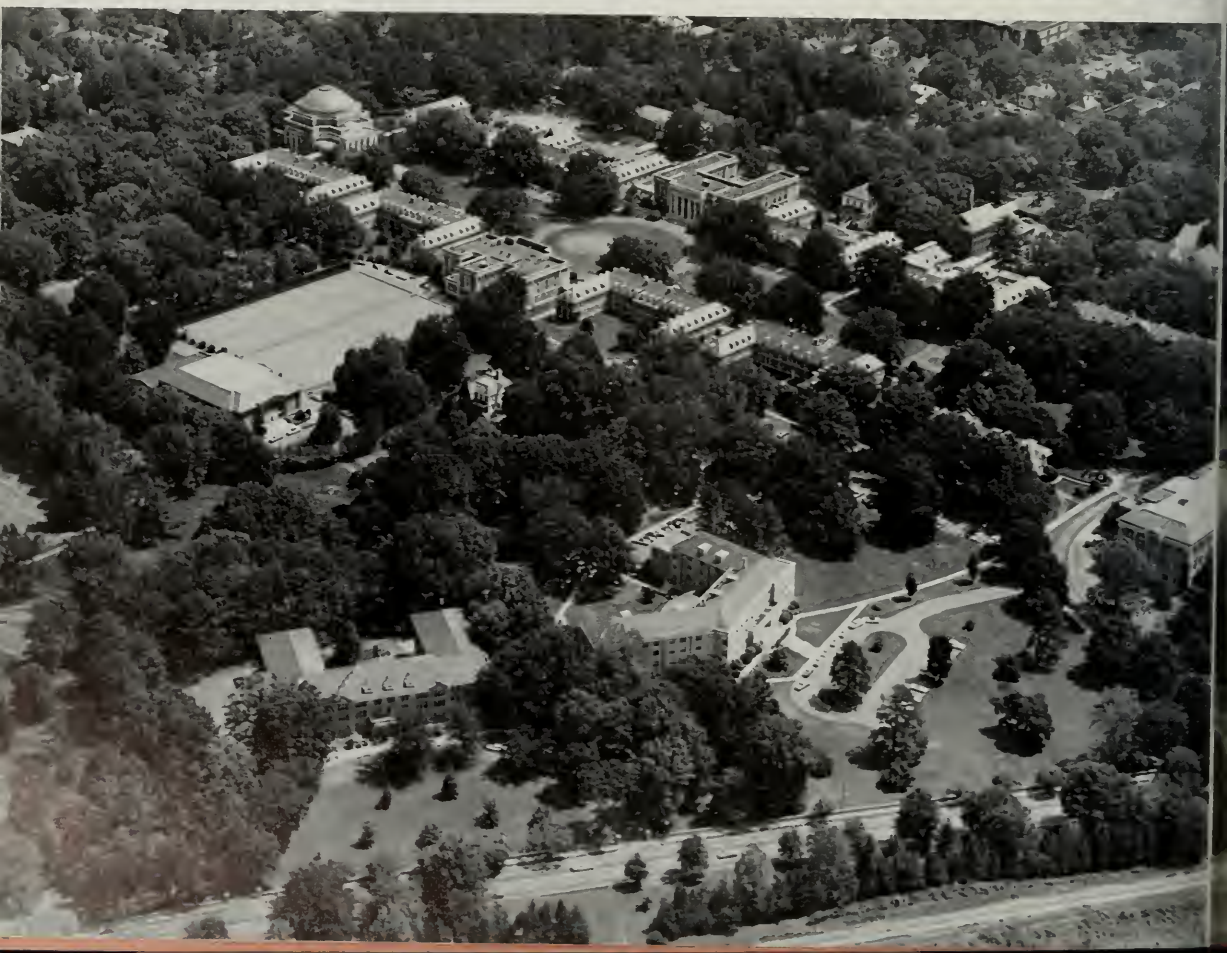
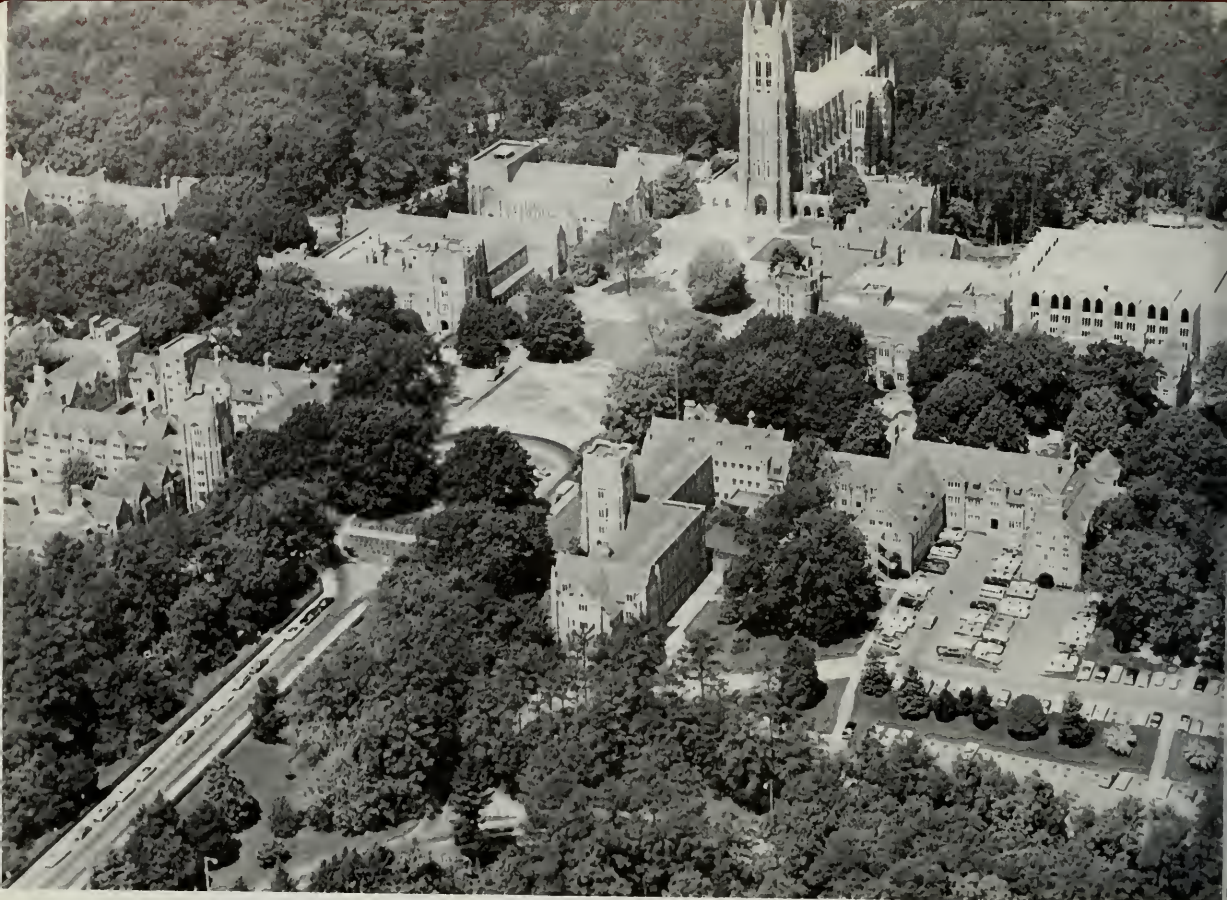


The School of Engineering

E. A. Bescherer, *Executive Director of Laboratories, Bell Telephone Company*
 Norman T. Buddine, *Chief Engineer, R. J. Reynolds Tobacco Company*
 Carl C. Chambers, *Vice President for Engineering Affairs, University of Pennsylvania*
 Carl F. Floe, *Vice President for Research Administration, M.I.T.*
 H. L. Flowers, *Deputy Director, Harpoon Program, McDonnell Douglas Astronautics Company*
 George R. Herbert, *President, Research Triangle Institute*
 J. Herbert Hollomon, *Special Assistant to the President, M.I.T.*
 Edwin L. Jones, Sr., *Chairman of the Board, J. A. Jones Construction Company*
 William S. Lee, *Vice President for Engineering and Construction, Duke Power Company*
 M. P. O'Brien, *Dean Emeritus, College of Engineering, University of California at Berkeley*
 Robert H. Pinnix, *President, R. H. Pinnix, Inc.*
 Joseph B. Platt, *President, Harvey Mudd College*
 W. Brewster Snow, *Quirk, Lawler and Matusky Engineers*
 F. W. Steckmest, *Consultant, Public Affairs, Shell Oil Company*
 Hugh E. Whitted, Jr., *Assistant Manager, Engineering, Western Electric Company*

The School of Nursing (Medical Center Board)

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 Martin M. Cummings, *Director, National Library of Medicine*
 James R. Felts, Jr., *Executive Director, Hospital and Child Care Sections, Duke Endowment*
 Ruth B. Freeman, *Professor of Public Health Administration, The John Hopkins University*
 John H. Knowles, *President, Rockefeller Foundation*
 Jacob Koomen, *State Health Director, North Carolina State Board of Health*
 Lucille Merchandante, *Visiting Professor and Consultant in Nursing Administration, State University of New York, Downstate Medical Center*
 Ben N. Miller, *Physician, Columbia, South Carolina*
 Raymond D. Nasher, *The Raymond D. Nasher Company*
 Frank W. Putnam, *Professor of Zoology, Indiana University*
 William R. Pitts, *Physician, Charlotte, North Carolina*
 Henry E. Rauch, *Vice Chairman, Board of Trustees, Duke University*
 June S. Rothberg, *Dean, School of Nursing, Adelphi University*
 John M. Russell, *Past President, The John and Mary R. Markle Foundation*
 Mitchell W. Spellman, *Dean, Charles R. Drew Postgraduate Medical School*
 Richard J. Stull, *Executive Vice President, American College of Hospital Administrators*



1

General Information

Duke University

Duke University has developed around a group of colleges which have their roots deep in the past. It was founded more than one hundred years ago when a small number of citizens from Randolph and adjacent counties assembled in a log school house to organize an educational society. They wished to provide lasting support for the local academy founded a few months before by an energetic son of North Carolina, Brantley York.

Moved by "no small share of philanthropy and patriotism," these men set forth their belief "that ignorance and error are the bane not only of religious but also of civil society" and that they "rear up almost an impregnable wall between man and the happiness he so ardently pants after." On that basis they formally adopted a constitution for the Union Institute Society. Thus in February, 1839, the academy became Union Institute. Twelve years later it was reorganized as Normal College expressly to train teachers. In order to expand its operations still further, the school was again reorganized in 1859 as Trinity College, a small liberal arts college. In 1892 it moved from the fields of Randolph County to the growing city of Durham. Thirty-two years later the College grew into Duke University.

Undergraduates at Duke. The present Trinity College, the liberal arts, residential college for undergraduate men within Duke University, bears the name and maintains the link with the parent institution. Originally a college for men, "Old Trinity" became a coeducational institution in 1896 when Washington Duke gave an endowment of \$100,000 upon the condition that women be admitted "on equal footing with men." In 1930 The Woman's College was established as a separate but coordinate college. Residences for undergraduate women, an administrative staff, library, and other supporting services were located on the East Campus, original Durham site of "Old Trinity."

Since the inception of the coordinate college organization, Trinity College and The Woman's College have shared departmental arts and science faculties responsible for both undergraduate and graduate programs of instruction. Accordingly, the

objectives of the two college administrations have been concerned primarily with the development of a sound, selective admissions program; the encouragement of studies of the curriculum and the introduction of special cocurricular programs for superior students to accommodate the changing needs of more select undergraduates; the discovery and maintenance of effective academic counseling services; and the establishment of a pattern of wholesome life in the dormitories—combining adult association and self-government—which supports the educational objectives of the colleges.

The School of Engineering traces its origin to the year 1851, when the catalogue of Normal College advertised a “classical” course which included surveying in the sophomore year and architecture and engineering for seniors. The Duke Endowment Indenture stipulated that Duke University include a number of specialized schools, among them “an Engineering School, as and when funds are available.” Separate departments were established for civil engineering and electrical engineering in 1927, and for mechanical engineering in 1931. In 1937 these three departments were grouped administratively to form the Division of Engineering, which in 1939 was incorporated into the University structure as the College of Engineering. In 1966 the name of the college was changed to the School of Engineering in recognition of its professional status at both the undergraduate and graduate levels. A Division of Biomedical Engineering, formed in 1967 as an administrative unit of the School of Engineering, and receiving joint sponsorship from the Medical School, was given departmental status in January, 1971. All four departments of the School of Engineering offer curricula leading to B.S.E., M.S., and Ph.D. degrees.

The School of Nursing was established in 1931 in association with the School of Medicine and Duke Hospital. When established, the three-year curriculum leading to the Diploma in Nursing was planned to prepare young women to meet community nursing needs. Students who also completed two years of acceptable college work were awarded a Bachelor of Science degree in Nursing as well as the Diploma in Nursing. The first joint diploma and degrees were awarded in 1938. Trends in nursing created a demand for a generic professional program in nursing, and a four-year program leading to the degree of Bachelor of Science in Nursing was approved by the University Board of Trustees in 1953. Also, in 1953, the School of Nursing was incorporated into the Division of Health Affairs in the University structure.

Resources of the University

As the University has developed around the core of undergraduate colleges and schools, the Graduate School has expanded in numbers of students and in areas of instruction and research; the School of Law of Trinity College became the Duke University School of Law; and other professional schools were established. The Divinity School was organized in 1926, the School of Medicine in 1930, the School of Forestry in 1938, and Graduate School of Business Administration in 1969.

The Faculty. A university faculty of over 1,050 maintains a tradition of personal attention to students. Many members of the faculty are or have been national leaders in their various professional organizations, as well as consultants to industry, government, or foundations, and their contributions to scholarship include many publications growing out of research. To honor outstanding faculty members, the University has established more than thirty James B. Duke professorships, in addition to other named professorships.

The Libraries. To support a rich educational experience in a world of rapid and far-reaching change, great library collections are essential. Undergraduate students at Duke are fortunate to have available exceptional resources. The University Library, among the first nineteen university libraries in the country, contains 2,231,519 volumes, 4,116,500 manuscripts, and about 250,000 maps, broadsides, photographs, and materials in microtext form. In 1970-71, 104,422 volumes were added; 13,798 periodicals and 180 newspapers are received currently.

A division of photographic services, with the most modern cameras and other equipment for microfilming and photographing printed and manuscript materials, provides a battery of reading machines to serve the library's large collection of microtext copies of rare books, periodicals, and newspapers. Comfortable reading and study rooms are provided also for those consulting rare books, manuscripts, government publications, newspapers, and periodicals.

The Woman's College Library, with its own attractive Georgian building, contains 185,000 volumes in an open stack collection, chiefly those books most frequently used in the undergraduate curriculum. The School of Engineering also maintains its own library which contains 47,000 volumes and 500 periodicals. The School of Nursing has a reference library of 7,000 books and periodicals located in Hanes House for the use of students majoring in nursing. Approximately 100 current periodicals on nursing and allied fields are available. Undergraduates in the four colleges and schools have ready access to five additional departmental and professional school libraries.

Science Laboratories. In addition to the teaching and research laboratories in the science departments (Botany, Chemistry, Geology, Physics, Psychology, and Zoology) and in the Schools of Engineering and Nursing, there are specialized facilities in which some advanced undergraduates work on individual projects. These include the Duke University Marine Laboratory in Beaufort, North Carolina; the Highlands Biological Laboratory in Highlands, North Carolina; the phytotron facility on the Duke campus; the Duke Forest adjacent to the campus; and the Triangle Universities Nuclear Laboratory, also on the campus. The Duke University Computation Center is used by students taking courses in computer science.



School of Nursing Instructional Facilities. Facilities for instruction in the School of Nursing include the resources available in the undergraduate, professional, and graduate schools and colleges of Duke University and the clinical facilities of Duke Hospital, Veteran's Administration Hospital, Durham Health Department, John Umstead Hospital, and numerous other health agencies in the vicinity.

"The Past is Prologue"

From academy to university some of the basic principles have remained constant. The Duke University motto, *Eruditio et Religio*, reflects a fundamental faith in the union of knowledge and religion, the advancement of learning, the defense of scholarship, the love of freedom and truth, a spirit of tolerance, and a rendering of the greatest service to the individual, the state, the nation, and the church. Through changing generations of students the objective has been to encourage each individual to achieve to the extent of his capacities an understanding and appreciation of the world in which he lives, his relationship to it, his opportunities, and his responsibilities.

Duke, a privately supported, church-related (Methodist) university, has about 8,500 students enrolled in its ten schools and colleges. These students annually represent nearly every state and over sixty foreign countries; there are now more than 45,000 alumni in seventy nations. The University is a member of the North Carolina and Southern Associations of Colleges and Schools, and of the Association of American Universities, which consists of forty-one outstanding institutions.

Purposes of the Undergraduate Colleges and Schools

Trinity College and The Woman's College. The curricular offerings, the educational facilities, and the University faculty are shared by the two undergraduate colleges of arts and sciences within Duke University, giving students a coeducational experience with maximum opportunity for the development of special interests and talents. Traditionally, Trinity College and The Woman's College have been administratively and residentially separate but coordinate, permitting each college, as a smaller undergraduate community within the University, to develop cocurricular programs and activities that reinforce curricular offerings and provide various ways of bringing students and faculty together. The coordinate college plan, originated by the Duke Indenture, has been reinforced through the years by the physical spread of the university campus. The traditional separation of the two colleges, however, is less distinct today, with developing federations of residential units of men and women and coeducational residential projects. The undergraduate liberal arts student in Duke University thus has many options of residential life and curricular and cocurricular programs.

School of Engineering. The undergraduate engineering program at Duke University is designed both for students who intend to become professional engineers and for those desiring a modern, general education, based on the problems and the promises of a technological society. The environment in which students are educated is as important in shaping their future as their classroom experiences. In the Duke School of Engineering, this environment has two major components: an environment of modern technology derived from the research and design activities of faculty and students in the School; and the liberal arts environment of the total University, with its humanitarian, social, and scientific emphases.



Engineering is not a homogeneous discipline; it requires many special talents. Some faculty members in the School of Engineering are designers; they are problem-oriented, concerned with teaching students how to solve problems—how to synthesize relevant information and ideas and apply them in a creative, feasible design. Other engineering faculty members function more typically as scientists; they are method-oriented, using the techniques of their discipline in their teaching and research to investigate various natural and man-made phenomena.

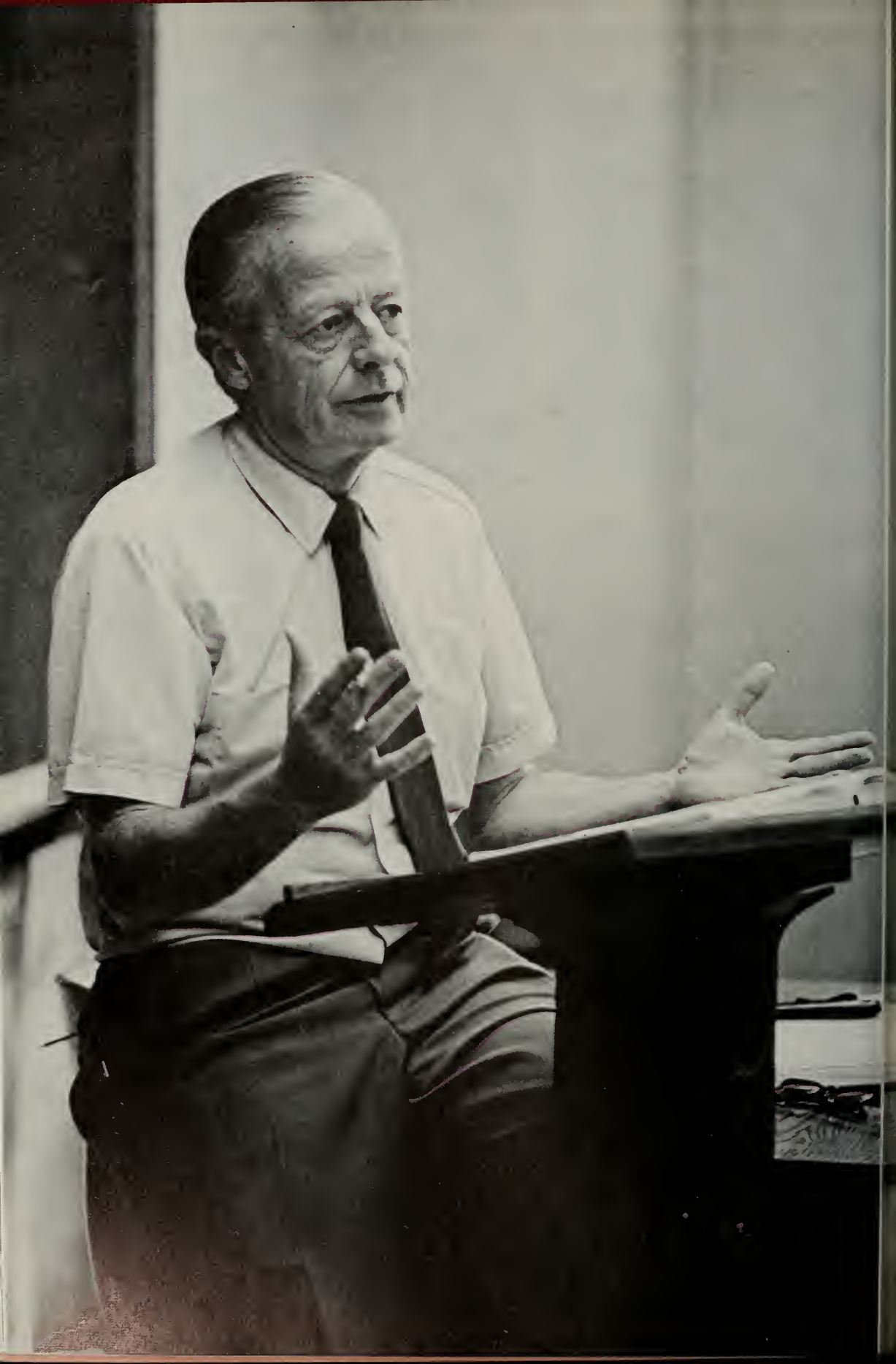
Engineering students at Duke develop the facility to reason and to communicate in at least two “languages”—English and mathematics, and they learn to understand man in both a private and a social context so they can apply technology to help improve the quality of life.

Four prescribed curricula are available in the School of Engineering: biomedical, civil, electrical, and mechanical engineering. Students also may elect to major in interdisciplinary engineering studies.

School of Nursing. The School of Nursing is committed to promoting human health and welfare through providing foundations for knowledgeable nursing services and is committed to contributing to the attainment of the University’s aims of teaching, research, and public service.

The faculty of the School of Nursing ascribes to the concept that a professional nurse is a person who has acquired the specialized knowledge of nursing, who has attained abilities useful in the practice of nursing, and who has developed attitudes appropriate to the profession of nursing.

The faculty believes that the primary aim of nursing education is to provide an environment in which the student can develop self-discipline, intellectual curiosity, the ability to think critically, and acquire the knowledge necessary for practice. The faculty believes that learning is manifested by change of behavior, resulting from experience; that an atmosphere for learning is one in which systematic direction and guidance of the learner is offered in a climate which encourages self-direction and creativity; that professional nurse education implies that the student who seeks admission to the School comes with the intent of practicing professional nursing; and that the curriculum offered aids the student in realizing this intent and in stimulating the desire for continued professional growth.



2

Degree Programs

Degrees Offered

Duke University offers in Trinity College and The Woman's College programs of study which lead to the degrees of Bachelor of Arts and Bachelor of Science; in the School of Engineering, the degree of Bachelor of Science in Engineering; and in the School of Nursing, the degree of Bachelor of Science in Nursing. Within the four-year curriculum of each college or school, the student has the major responsibility for devising and carrying through a course program appropriate to his goals and background. He is assisted in this task by departmental directors of undergraduate studies, supervisors of freshmen instruction, faculty advisers, and by the academic deans of his school or college.

The Arts and Sciences Curriculum: Two Approaches to a Bachelor's Degree

Academic programs in Trinity College and The Woman's College are designed for students who want to major in one of the following subjects or in approved interdepartmental programs: accounting, anthropology, art, black studies, botany, chemistry, classical studies, economics, elementary-school education, English, French, genetics, geology, German, Greek, history, Latin, management sciences, mathematics, medieval and renaissance studies, music, philosophy, physical education for women, physics, political science, psychology, religion, Russian, science education, sociology, Spanish, and zoology. In addition to completing a major, a student must complete courses in other divisions of the curriculum and satisfy requirements relating to quality of academic work and residence in one of the colleges. A portion of the curricular and credit requirements for both the A.B. and B.S. degrees may be satisfied through the Advanced Placement Program of the College Entrance Examination Board undertaken before enrollment in the colleges or schools.

The academic programs described below lead to either the A.B. or B.S. degree and provide two distinct approaches to a liberal arts education—Program I and Program II. To be graduated with either the A.B. or B.S. degree in Program I or Program II, a student must earn at least thirty-two semester-courses, or their equivalent in an approved curriculum. The term *semester-course* (s.c.) defines the unit of academic instruction and credit. Each semester-course consists of three or more hours of instruction a week throughout the semester. Parts and multiples of the semester-course are also recognized, such as half-courses and double-courses. (Whenever the term *course* appears in this *Bulletin*, reference is to a semester-course unless otherwise indicated.)

PROGRAM I: CURRICULAR REQUIREMENTS

Program I provides a flexible approach to the A.B. or B.S. degree by enabling a student to choose, within broadly stated requirements, that particular academic subject matter which best satisfies his intellectual interests and educational goals. Although specific requirements exist regarding proficiency in English composition and in physical activity, optional methods of satisfying those requirements are provided. Through a variety of small-group learning experiences and independent study, Program I assures each student the opportunity to undertake at least a portion of his undergraduate study in closer association with faculty and fellow students than may normally be provided in regular classroom instruction and large lectures. A detailed description of Program I is given below, with requirements for graduation explained in terms of curriculum, course credits, grade-average, and residence.

Distribution of Courses. Program I enables a student to achieve breadth of academic and intellectual experience by requiring that he complete a number of semester-courses in each of the three divisions into which the academic departments of the arts and sciences are grouped. The courses selected in each division must be those in which the essential subject matter and substance of the discipline are presented. Interdepartmental and interdivisional courses may not be used to satisfy divisional requirements; and courses offered in one division may not be used to satisfy distributional requirements in another division. No introductory skill courses may be used to satisfy distributional requirements. (See the section below concerning skill courses.) The three divisions and the academic departments within each are:

Humanities. Art, Classical Studies (including Greek and Latin), English, Germanic Languages and Literature, Music, Philosophy, Religion, Romance Languages (including French, Italian, Portuguese, and Spanish), and Slavic Languages and Literatures (including Russian).

Natural Sciences and Mathematics. Botany, Chemistry, Geology, Mathematics, Physics, and Zoology.

Social Sciences. Economics, Education, Health and Physical Education (Woman's College), History, Management Sciences, Political Science, Psychology, and Sociology and Anthropology.

Courses on the Pass/Fail basis do not satisfy the distributional requirements. A student must successfully complete courses in each of the three divisions as follows:

First division. Each student must concentrate (or major) in a single discipline or in an interdisciplinary program. He is required to take a number of courses in that discipline or in that interdisciplinary program, as determined by the department

or departments concerned. In so doing he will automatically complete courses in one of the three divisions described above. The division of the concentration (or major) is called the first division (see below page 12).

Second division. A student must pass at least four semester-courses in a second division of his own choice. To satisfy this requirement, all four courses may be selected from one department within the division, or the four courses may be distributed among two or more departments. At least two of the four courses must be at the advanced level. (See pp. 12-13 regarding advanced work.)

Third division. A student must pass at least two semester-courses in a third division of his own choice. The courses may be at the introductory or advanced level. Both courses may be taken in one department within the division, or one course may be selected from each of two departments. In the latter case, however, a student should first determine that the course chosen is not part of a sequence of two courses (a so-called hyphenated course), both of which must be taken to obtain credit for either course.

Skill Courses. As noted previously, there is one general limitation upon the choice of courses for distributional purposes. Elementary skill courses may not be used to satisfy the distributional requirements in any of the three divisions. For instance, neither English composition nor elementary foreign language courses count as courses in humanities, because developing skill in composition or speech is different from encountering linguistics or literature. Skill courses are listed below. In planning course selections to meet distributional requirements, students should consult this list, not for purposes of avoiding such courses but rather to assure that courses chosen to meet distributional requirements actually serve that purpose.

Skill Courses That Do Not Satisfy Distributional Requirements of Program I

Department	Courses
Art	53-54
Chinese	101-102 (UNC-CH); 131, 132; 133, 134
Classical Studies	Greek 1-2; 63-64 Latin 1-2; 63-64
Education	105; 106; 107; 108; 151; 152; 153; 154; 161; 162; 195; 196; 201; 215; 216; 225; 226; 236; 237; 239; 241; 246; 266; 276
English*	1; 50 (51); 65-66; 101; 103-104; 110 (151); 120; 130; 139
Germanic Languages and Literature	1-2; 63-64; 105; 117, 118; 181, 182
Health and Physical Education (Women)	P.E. 61-62; 102; 103; 105-106; 117; 119S; 120; 132; 133; 161-162; 181; 182; 185 H.E. 101-102; 134
Hindi-Urdu	181, 182; 183, 184
Japanese	151, 152; 153, 154
Music	57-58; 65; 107, 108; 151; 152; 153; 154; Applied Music
Psychology	117
Romance Languages	French 1-2; 63; 64; 97; 98; 127; 150; 181-182 Italian 1-2; 63; 64; 181-182 Portuguese 181-182 Spanish 1-2; 63; 64; 97; 176; 181-182
Slavic Languages and Literatures	1-2; 63-64
Swahili	101, 102

*The numbers in parentheses are course numbers used prior to fall, 1970.

In addition, certain courses, e.g., military science courses and courses outside the departments of arts and sciences, do not satisfy distributional requirements since they are not included within the curricula of departments normally recognized as falling within any of the three divisions.

Proficiency in English Composition. Each student is required to demonstrate his ability to write good English by presenting either a score of 700 or higher on the College Entrance Examination Board (CEEB) English Composition Achievement Test, or by passing a semester-course (English 1) in English composition in the first semester of the freshman year. A student presenting a 700 or higher score on the CEEB Test satisfies the English composition proficiency requirement for graduation, but does not receive course credit for English 1. When the proficiency requirement is satisfied by passing English 1, that course counts among the thirty-two semester-courses required for graduation.

Proficiency in Foreign Language. Certain departments recommend or require foreign language proficiency for their majors. Candidates for the B.S. degree may be required by their major departments to be proficient in a particular foreign language.

A student may demonstrate proficiency in a foreign language by successfully completing courses at Duke, or by achieving a satisfactory score on one of the following appropriate tests: (1) CEEB Achievement Test; (2) CEEB Advanced Placement Program Examination; or (3) CEEB College Placement Test. Course credit toward graduation is given only for successfully completing language courses or for certain Advanced Placement Program work in language undertaken in high school; course credit is not given when the language proficiency requirement is satisfied by means of CEEB Achievement or College Placement Test, or a Duke proficiency test. (See pages 35-37, Advanced Placement.)

Learning Experiences. Another feature of Program I is the provision of small-group and independent learning experiences which a student is required to have as a part of his academic work.

Small-Group Learning Experiences. To supplement the normal classroom and large lecture method of instruction, four types of small-group learning experiences are offered.

A *seminar* is a course normally with twelve to fifteen students, in which, instead of hearing lectures, the student engages in discussion, develops skills, refines judgment, and has his ideas challenged.

A *preceptorial* is a discussion between an instructor and no more than twelve students. It is an additional and optional unit attached to a regular course. It allows a student to carry his interest and learning in a particular subject further than that required in the regular class. If a regular class normally meets three times a week, the preceptorial would be a fourth one-hour meeting.

A *discussion section* is comprised of approximately ten students and an instructor in a group that is part of a regular course. It is distinguished from a preceptorial in that *every* student in the course participates in a discussion group, whereas the preceptorial is optional. The preceptorial is an opportunity for intensive additional study, whereas a discussion group is an integral part of a lecture course given to large groups.

A *tutorial* is a meeting between one instructor and one to three students, independent of any other course.

Courses or sections of courses offering the above small-group experiences are

indicated by a suffix to the course number: *S* (for seminar), *P* (for preceptorial), *D* (for discussion section), or *T* (for tutorial).

Independent Study, Including Independent Projects and Theses. One aspect of the philosophy underlying Program I is that a Duke student should be given latitude to choose, within broadly stated requirements and with good faculty advising, the academic courses that best suit his intellectual interests and educational goals. A related idea is that he should also be encouraged to assume—again, with faculty guidance and assistance—increasing responsibility for his own education as he proceeds toward graduation. Accordingly, Program I makes provision for independent study, particularly in the junior and senior years. Such study should enable a student to apply his knowledge and skills in a variety of ways toward the accomplishment of immediate academic goals, and also to cultivate a desire and capacity for continued self-education following graduation.

Independent study may take a variety of forms, depending upon the subject matter and research methods of the several disciplines, as well as upon the interests of students and the professors who supervise their independent work. In some instances, it may consist of extensive reading and research in the literature of a discipline, followed by the writing of a substantial paper. In other cases, a student may prepare a laboratory research project, work in field research, or he may write or produce a play or compose a novel.

A special form of independent study, particularly for departmental majors, is the preparation of a thesis or the completion of a major independent project in the junior, but especially in the senior year. Again, the precise nature of the thesis or independent project will vary with the subject matter and research methods of the discipline in which it is undertaken. When undertaken in the senior year, independent study might serve any one of a number of valid educational purposes. For some students it would provide an opportunity for integrating their understanding of the disciplines in which they have majored. For others it would permit more intensive consideration of specific topics previously encountered but insufficiently explored. And for still others, it would be the occasion for truly original research and the development of new insights and knowledge within the disciplines. In any case, the senior thesis or independent project would represent a substantial endeavor in independent scholarship and research, and when used to its fullest potential, it could be the most rewarding educational experience in a student's undergraduate career.

*Learning Experience Requirements.** Students who enter after May, 1972, are required to have the following small-group and independent learning experiences:

1. *Freshman year*

- a. A seminar in one semester, or
- b. Two preceptorials, discussion sections, or tutorials during this year, as the terms *preceptorial*, *discussion section*, and *tutorial* are defined in the preceding description.

2. *Sophomore year*

- a. A seminar in one semester, or
- b. Two preceptorials, discussion sections, or tutorials during this year, as the terms *preceptorial*, *discussion section*, and *tutorial* are defined in the preceding description.

* Students who entered between September 1969 and May 1972 must satisfy the Learning Experience Requirement as stated in the 1971-1972 *Bulletin*.

3. *Junior and senior years*

- a. A combination of seminars or independent study, with credit equal to at least two semester-courses, or
- b. A thesis or an independent project at some time during the student's junior or senior year for which he would receive credit for two semester-courses.

These requirements are the minimum for both the A.B. and B.S. degrees. Although a student is not prohibited from enrolling in additional small-group sections or courses or in independent study beyond the required minimum, preference will be given to those needing such learning experiences to satisfy the above requirements.

Concentration. Although students in Program I are expected to achieve breadth of intellectual experience by taking courses in each of the three divisions of learning within the University, they are also expected to acquire some mastery of a particular discipline or interdisciplinary area. Each student must, therefore, concentrate a portion of his studies in a single department or in an approved interdisciplinary program. The former type of concentration is called the *departmental major*; the latter, *interdepartmental concentration*.

Departmental Major. To pursue a departmental major, a student in Program I must pass a number of courses within the major department as specified by that department and approved by the faculty, as well as courses in other departments as may be necessary or helpful to effective performance in the major. These requirements are set forth in the section entitled *Departmental Major* following each department's course descriptions. A student should be familiar with this information when making his choice of major and review it at each registration period.

A major consists of at least five courses in one department above the introductory level. A department may not require a student for the A.B. degree to take more than eight semester-courses above the introductory level in the major, although the student may elect to do so. A department may not require a student for the B.S. degree to take more than ten semester-courses above the introductory level in the major, although the student may elect a more intensive major program. Foreign language departments may at their discretion begin their major after the elementary and intermediate courses. (See pages 40-41 for procedure for declaring the major.)

Interdepartmental Concentration. Some students in Program I may desire to pursue an interdisciplinary program in two or more departments as an alternate means of satisfying the concentration requirement. An interdepartmental concentration consists of at least three courses beyond the introductory level in each of two or more departments. Courses in other departments or demonstration of proficiency in areas relevant to the objectives of the program may be required. An interdepartmental concentration must be planned early in the undergraduate career. Students who declare interdepartmental concentrations must identify and satisfy second and third divisional requirements. (See page 40 for procedures for planning and declaring an interdepartmental concentration.)

Double Major. A student who completes requirements for the major in two departments may have both majors entered on his official record. (See page 41 for procedures for declaring a second major.)

Advanced Work. As previously noted, a student in Program I must complete at least thirty-two semester-courses in an approved curriculum to graduate with

an A.B. or B.S. degree. Of that number of courses, at least twelve must be at the advanced level. Normally, advanced-level courses are numbered in the 100- and 200-series, although there is some variation among departments. (Courses numbered 200 or above are senior-graduate courses. See page 38 for regulation concerning the limited eligibility of non-seniors in 200-level courses.) This requirement may be satisfied by passing advanced-level courses in any of the three divisions of learning earlier described. In satisfying the distributional requirement for the second division, a student must complete at least two advanced courses. Normally he completes a number of such courses by meeting his major or interdepartmental concentration requirements. The remainder of the twelve may be taken as courses in the major, as distributional requirements, or as electives. To determine requirements for admission to advanced courses in a particular department, a student should consult that department's description of its courses and prerequisites.

Physical Activity. All students are required to complete two semesters of approved physical activity unless excused for medical reasons. This requirement may be met either by satisfactory completion of two semesters in appropriate physical education courses or by an alternate form of physical activity approved by the appropriate department of physical education. The work is normally completed in the freshman year. Pass/fail grades are assigned for performance in required physical education courses and for alternate forms of physical activity. Physical education courses or alternate forms of physical activity do not count among the thirty-two courses needed for graduation. Nevertheless, each student must complete this requirement to be graduated. Elective activity courses for credit are available for students who have completed the requirement.

A student who has completed a full calendar year or more of active duty in the military forces of the United States may be excused from one semester of the requirement in physical education for each six months of such active duty.

Military Science Courses. No more than four courses in the military sciences may be counted among the thirty-two courses required for graduation. For students participating in either the Air Force or Naval ROTC program, the four courses for which graduation credit may be earned are normally taken in the junior and senior years. Enrollment in a few additional courses and laboratories in earlier years is required by the services to qualify for an officer's commission. Although not counted toward graduation, such additional courses, if completed, appear on a student's permanent academic record.

Course Requirements for Graduation. To be graduated with either the A.B. or B.S. degree in Program I or Program II a student must pass at least thirty-two semester-courses, or their equivalent in terms of half-courses and double-courses, in an approved curriculum.

Residence Requirements. A residence period of four academic years, that is, eight semesters, is the normal amount of time a student may take to earn either the A.B. or B.S. degree. This period may be extended by one or two semesters when, in the opinion of a student's academic dean, legitimate reasons underlie the student's failure to be graduated in eight semesters, and it seems probable that such extension will enable the student to complete all remaining requirements for graduation. A student will not be permitted residence of more than five academic years, that is, ten semesters, in order to be graduated.

For the minimum residence period, at least sixteen courses must be satisfactorily completed at Duke. If only sixteen courses are taken at Duke, they must include the courses of the final two semesters. Students with more than sixteen

courses at Duke may take two courses of the last year in another institution of approved standing. With the approval of their major adviser and their academic dean, students who have completed six full semesters of work at Duke may take four courses in their last year at another institution of approved standing. Any courses taken elsewhere must be approved by the student's adviser and academic dean.

Former students of The Woman's College who have been out of college for six or more years may take up to ten courses or thirty semester-hours of work in another institution of approved standing in final fulfillment of requirements, providing that (1) she was in good standing when she withdrew from Duke; (2) she proposes *in advance* a plan which ensures that the work to be taken elsewhere will be comparable to the work required at Duke; (3) she demonstrates that to return to Duke to complete the work for the degree would be either impossible or occasion serious hardship; and (4) she is prepared to take Duke examinations on any courses taken elsewhere if required by the department concerned.

Continuation Requirements. A student must achieve a satisfactory record of academic performance each semester and make satisfactory progress toward graduation to continue his enrollment in his college. A student who fails to meet the minimum requirements outlined below must leave his college for at least two semesters. A summer session may be counted as a semester. Following a student's application for readmission, his return must be approved by the dean of his college. If the student thereafter fails to meet continuation requirements, he will be permanently dismissed from the college.

Satisfactory Performance Each Semester. To remain in college a student must not fail three or more courses in the first semester of the freshman year or fail two or more courses in any subsequent semester.



Satisfactory Progress toward Graduation. A student must pass in an approved curriculum at Duke the following number of semester courses (or their equivalent in half-courses or double-courses) to continue from one academic year to a subsequent year. (Summer terms at Duke may be used to meet this requirement.)

To begin enrollment in a
second year
third year
fourth year
fifth year

a student must have passed
six semester-courses
fourteen semester-courses
twenty-two semester-courses
twenty-eight semester-courses

In addition, a student must make satisfactory progress toward fulfillment of the various curricular requirements described on pages 8-15 of this *Bulletin*.

Students are reminded that in cases where continuation is in question, incomplete work in any course is counted as a failure to achieve satisfactory performance in that course. Such courses must be completed in time for final grades to be submitted to the Registrar no later than the day preceding Registration Day for the spring semester, or for the first term of the summer session. In the case of incomplete work in the spring semester, this requirement applies whether or not the student plans to attend one or more terms of the summer session.

Any student excluded from his college under the provisions of this regulation may at his request have his case reviewed by the Dean of Undergraduate Education.

PROGRAM II: INDIVIDUALLY DESIGNED PLANS OF STUDY

Nature and Purpose. A second approach leading to either the A.B. or B.S. degree is Program II. In general, this program offers the student who has a special interest or talent in a single field, or an unusual combination of interests or talents in several fields, an opportunity to plan, with the counsel of a single department or an interdepartmental committee, a special curriculum of academic and related work adapted to the exceptional qualities the student possesses. Together, the student and his departmental Program II adviser design an individual plan of work for the whole or the remainder of the student's college career. They assess his background, needs, and ambitions and evaluate the resources of the University and those outside it as means of satisfying those ambitions. They consider what academic courses would be useful, but also consider other options. For example, a full semester or year of independent study, equivalent to a normal course-load under Program I, might be agreed upon for a work-study program off-campus, or a period of study abroad might seem most pertinent. Regardless of the features of an individually designed curriculum, each is tailored to the special interests and talents of the student for whom it is designed.

Admission. A student interested in being considered for Program II may confer first with his academic dean about his eligibility for the program, or he may confer directly with the director of undergraduate studies in the department closest to his interest. If he appears eligible for Program II, the director, other adviser, or an interdepartmental committee will help the student design his curriculum. When an interdepartmental committee is needed, one department will bear administrative responsibility. The curriculum must be approved by the department and also by the Committee on Program II of the Arts and Sciences Faculty. Upon endorsement by that committee, it becomes an obligation assumed by the student, though it may later be modified with the approval of the department and the Committee on Pro-



gram II. A description of the plan is sent to the student's academic dean and each semester the student's progress in achieving the plan is also reported.

Until formally designated a Program II student, a student should register for courses and satisfy the curricular requirements of Program I. Upon acceptance into Program II, a student is relieved of most, but not all, requirements expected of Program I students. Should he leave Program II for any reason, he assumes all requirements of Program I.

Normally, a student will be accepted into Program II only after he has been in residence at Duke for one or two semesters and has shown during that period that he possesses the necessary qualifications for admission. Nevertheless, a freshman who believes that he qualifies for Program II and desires to be admitted in his first semester at Duke is invited to write the dean of freshmen of his college during the summer months preceding matriculation, providing him with a complete statement of his qualifications and plans as a prospective Program II student.

General Requirements. Apart from the requirements arising from his approved plan of work, a Program II student must satisfy certain general requirements which are also applicable to students in Program I. These requirements have been set forth in the foregoing explanation of Program I, under the following headings: Course Requirements for Graduation, see page 13; Physical Activity, see page 13; Military Science Courses, see page 13; Residence Requirements, see page 13; Although the normal and maximum periods of residence apply to students in Program II, the requirements relating to the last two semesters may be adjusted to suit the student's approved plan of work.

Bachelor of Science in Engineering

Duke University offers in the School of Engineering programs of study which lead to the degree of Bachelor of Science in Engineering (B.S.E.), with majors in the departments of biomedical, civil, electrical, and mechanical engineering. Special programs of study in interdisciplinary fields (see page 21) leading to the B.S.E. degree may be arranged with approval of the engineering faculty. The programs in civil, electrical, and mechanical engineering are accredited by the Engineers' Council for Professional Development, and the School of Engineering will ask for accreditation for the newly established biomedical engineering curriculum in the near future.

For graduation with a Bachelor of Science in Engineering degree, a student entering after September 1, 1969, must complete successfully a minimum of 32 semester-courses plus two physical education activity courses. These 32 semester-courses must include the following:

General Requirements

English	1 s.c.	This requirement is met by completing English 1.
Mathematics	4 s.c.	This requirement is met by completion of Mathematics 31, 32, 73, and 74.
Natural Science	3 s.c.	This requirement is met by completing Chemistry 1 and Physics 51 and 52.
Social Sciences and Humanities	4 s.c.	This requirement is met by completion of four courses from at least two departments in the humanities and social sciences. This program of courses should reflect a rationale or fulfill an objective appropriate to the engineering profession. Courses selected must be those which present essential subject matter and substance of the discipline; for example, no introductory skill courses may be used to satisfy this requirement. Likewise, courses devoted primarily to subjects such as accounting, industrial management, finance, personnel administration, introductory language, and ROTC normally do not fulfill this objective regardless of their general value in the total engineering curriculum.
Engineering and Applied Sciences	3 s.c.	This requirement is met by completion of at least one course from each of three of the following four areas: electrical science, materials science, mechanics, and thermal science. See departmental requirements, which follow, for any specific courses to be included.
Digital Computation		Students are expected to have acquired a digital-computer programming capability before their sophomore year.

Departmental Requirements

Departmental Specifications	17 s.c.	The department administering the major field of study will specify the nature of this requirement. In general it will consist of both required courses and electives to be planned in consultation with the departmental adviser. See the individual departmental requirements, which follow.
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*Total Minimum
Requirement 32 s.c.

*A maximum of two semester courses of junior or senior level air science or naval science course work may be counted in satisfying the minimum requirements of 32 semester-courses for a baccalaureate degree in engineering. These courses must be included in the 17 s.c. listed under departmental requirements. All other courses completed in air science or naval science are taken in addition to the minimum program.

Program of Studies for the Freshman Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
Chem 1—Gen. Inorganic Chem. ..	1	Physics 51—Gen. Physics	1
English 1—Freshman Composition	1	Math 32—Intro. Math. Analysis	1
Math 31—Intro. Math. Analysis ..	1	Elective†	1
Elective†	1	Elective†	1
PE—Physical Education		PE—Physical Education	
<hr/>		<hr/>	
4†		4†	

†Each student is encouraged to plan a program designed for his individual needs. His faculty adviser will be available to assist him beginning with the opening of Freshman Week. Advice should be sought relative to the most effective use of electives in relation to the special requirements of the various engineering majors.

It should be noted that students are expected to have acquired a digital-computer programming capability before their sophomore year.

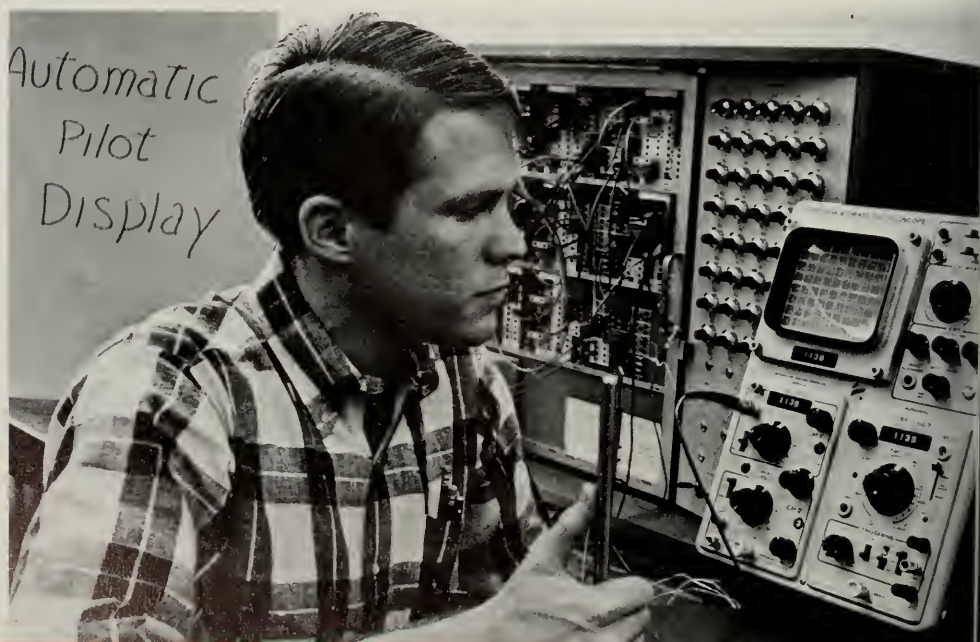
‡The normal load each semester is four courses (or an equivalent combination of courses, half-courses, and double courses). Engineering students taking air science or naval science may need to schedule a course in military science as a supplement to the normal load.

Biomedical Engineering Department

The general requirements and departmental requirements are all incorporated in the following sequence. This is only one of several possible sequences. The student is encouraged to choose electives and select a sequence which serves mature educational needs.

Freshman Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
Chem 1—Gen. Inorganic Chem. ..	1	Chem 2—Gen. Inorganic Chem. ..	1
English 1—Freshman Composition	1	Biol 14—Intro. to Biology	1
Math 31—Intro. Math. Analysis ..	1	Math 32—Intro. Math. Analysis ..	1
CPS 51—Intro. Digital Comp.	1	Soc. Sci. or Humanities Elec.	1
PE—Physical Education	—	PE—Physical Education	—
<hr/>		<hr/>	
4		4	



Sophomore Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
Physics 51—Gen. Physics	1	Physics 52—Gen. Physics	1
Egr 72—Introd. System Dynamics	1	BME 112—Biol. Syst. Analysis	1
Math 73—Interm. Math. Analysis.	1	Math 74—Interm. Math. Analysis	1
Egr 83—Structure of Solids	1	Soc. Sci. or Humanities Elec.	1
	<hr/> 4		<hr/> 4

Junior Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
Math Elective	1	BME 172—Biomed. Transfer Proc.	1
BME 161—Biomed. Measurements	1	Approved Elective	1
Egr 122—Transport Phenomena ..	1	Approved Elective	1
Chem 61—Phys. Chem. of Aq. Sol.	1	Soc. Sci. or Human. Elective	1
	<hr/> 4		<hr/> 4

Senior Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
BME 181—Biomedical Modeling ..	1	Approved Elective	1
Biology Elective	1	Approved Elective	1
Approved Elective	1	Approved Elective	1
Soc. Sci. or Human. Elective	1	Soc. Sci. or Human. Elective	1
	<hr/> 4		<hr/> 4

Civil Engineering Department

The general requirements and the departmental requirements are all incorporated in the following typical program.

Freshman Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
Chem 1—Gen. Inorganic Chem. ..	1	†CE 16—Surveying	½
English 1—Freshman Composition	1	†Egr 11—Visual Communication ..	½
Math 31—Introd. Math. Analysis	1	Physics 51—Gen. Physics	1
‡Approved Elective	1	Math 32—Introd. Math. Analysis	1
PE—Physical Education	—	‡Approved Elective	1
		PE—Physical Education	—
	<hr/> 4		<hr/> 4

Sophomore Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
*Egr 75—Mechanics of Solids	1	EE 63—Electric Networks	1
Math 73—Interm. Math Analysis	1	Egr 83—Structure of Solids	1
Physics 52—General Physics	1	Math 74—Interm. Math Analysis	1
‡Approved Elective	1	‡Approved Elective	1
	<hr/> 4		<hr/> 4

Junior Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
CE 131—Struct. Anal. I	1	CE 123—Water Resources	1
Egr 123—Dynamics	1	CE 133—Struct. Design I	1
Egr 145—Fluid Mechanics	1	Egr 104—Heat Transfer	1
‡ Approved Elective	1	‡ Approved Elective	1
	4		4

Senior Year

<i>First Semester</i>	<i>Courses</i>	<i>Second Semester</i>	<i>Courses</i>
CE 124—Environment Egr.	1	CE 116—Transportation	1
CE 134—Struct. Design II	1	‡ Approved Elective	1
CE 139—Soil Mechanics	1	‡ Approved Elective	1
‡ Approved Elective	1	‡ Approved Elective	1
	4		4

*Students having completed CE 12 should substitute CE 73 for Egr 75.

†May be taken in the fall or spring semester of the freshman or sophomore year.

‡Part of a program of elective courses planned with departmental approval to suit the interests and abilities of the individual student. In addition to satisfying the social science-humanities requirement of the School of Engineering, the program must include a minimum of one elective course in natural science. The program should also include a minimum of three *emphasis electives*, designed to reinforce the student's major area of study; at least one emphasis elective must be a civil engineering course.

Electrical Engineering Departmental Requirements*

Mathematics	1 s.c.	Mathematics elective beyond Math 74.
Basic Science	1 s.c.	Basic science elective (In addition to 3 s.c. in natural science listed under general requirements.)
Social Sciences and Humanities	2 s.c.	Social sciences-humanities elective (in addition to 4 s.c. listed under general requirements).
Courses in Major	1 s.c.	EE 113—Introductory System Theory.
	1 s.c.	EE 143—Fields and Continua.
	4 s.c.	EE electives.
Approved Electives	1 s.c.	Must be an engineering science course taught within the School of Engineering.
Approved Electives	2 s.c.	Must be in engineering science, physical science, or mathematics.
Approved Electives	4 s.c.	
Other courses	15 s.c.	Listed under general requirements.

*One of the three courses in engineering and applied sciences as listed under general requirements must be EE 63.

Mechanical Engineering Departmental Requirements*

Mathematics	1 s.c.	Mathematics elective beyond Math 74.
Natural Science	1 s.c.	Natural science elective (in addition to 3 s.c. listed under general requirements).

*The three courses in engineering and applied sciences listed under general requirements must be Egr 72, Egr 75, and Egr 83.

Social Sciences and Humanities	1 s.c.	Social sciences-humanities elective (in addition to 4 s.c. listed under general requirements).
Courses in Major	1 s.c.	ME 101—Thermodynamics.†
	1 s.c.	ME 123—Dynamics.†
	1 s.c.	ME 126—Fluid Mechanics.†
	1 s.c.	ME 136—Response of Systems.†
	1 s.c.	ME 141—Mechanical Design.†
	1 s.c.	ME 150—Heat and Mass Transfer.†
Emphasis Electives	4 s.c.	Advanced technical electives, chosen to emphasize a professional objective in the curriculum.
Approved Electives	4 s.c.	
Other Courses	15 s.c.	Listed under general requirements.

†A program of study in the Department of Mechanical Engineering must contain a minimum of nine subjects taught within the School of Engineering. The six particular ME courses listed here and the three courses Egr 72, Egr 75, and Egr 83 listed under general requirements form the foundations of a normal mechanical engineering program.

Interdisciplinary Programs in Engineering. This major parallels the majors in biomedical, civil, electrical, and mechanical engineering. It provides for special programs of study in interdisciplinary fields, such as energy conversion, engineering mechanics, materials science, ocean engineering, pollution control, systems and controls, and urban engineering, leading to the B.S.E. degree, which may be arranged with approval of the engineering faculty. Any student, in consultation with his adviser or another faculty member, may propose a unique combination of courses designed to meet his particular career objectives. His proposal should be submitted to the Engineering Faculty Council, through the Dean of the School of Engineering, for approval; it may be submitted as early as the second semester of the freshman year and must be submitted before the beginning of the senior year. The proposal should include the student's reasons for pursuing the suggested program of study, and it must show how the proposed courses satisfy the following requirements:

1. The proposed program of study meets the general requirements for the B.S.E. degree but cannot be accommodated by the approved departmental requirements in biomedical, civil, electrical, or mechanical engineering.
2. A program of at least eight engineering courses is included to provide depth in the selected interdisciplinary area of study.
3. A program of at least five courses, in addition to the fifteen courses listed under general requirements, is included to provide breadth in technical (engineering, natural science, and mathematics) areas.
4. The remaining courses, which are treated as electives, require the approval of the student's adviser.

Each student enrolled in an approved interdisciplinary program will be assigned to the appropriate engineering department for administrative purposes.

Residence Requirements. At least sixteen semester courses must be completed satisfactorily at Duke. This must include the work of the final two semesters with the following exceptions: the student who has completed more than four full semesters of work at Duke may take the last two courses elsewhere; others may take one last course elsewhere. The courses taken elsewhere must be approved by the student's major adviser and his academic dean.

Continuation Requirements. A student must achieve a satisfactory record of academic performance each semester to continue his enrollment in the University.

His academic performance must be such that he will be able to complete his degree program in ten semesters with a normal course load.

A student must pass at least two courses in the first semester of the freshman year and at least three courses in any subsequent semester. A student who fails to meet this continuation requirement must leave the University for at least two semesters. A complete summer session may be counted as a semester. Following a student's application for readmission, his return must be approved by the Dean. If the student thereafter fails to pass three courses in a semester, he will be permanently dismissed from the University. A student who fails two or more courses in a given semester will not be permitted to enroll for more than four courses in the following semester without the approval of the Dean. In addition, a student may be dismissed temporarily or permanently for failing to make satisfactory progress toward graduation. In such circumstances, the student may be required to leave the University, either temporarily in order to remedy the conditions that explain his poor performance, or permanently when such action appears in the best interest of both the student and the University.

Grade Requirements for Graduation. For students entering after September 1, 1969, of the 32 semester-courses required for graduation, 28 or their equivalent in terms of double-courses and half-courses must be passed with grades of C— or better.

Bachelor of Science in Nursing

The baccalaureate program is designed to produce a professional nurse who has (1) an understanding and appreciation of man and his relationships, opportunities, and responsibilities in his dynamic environment, and (2) the knowledge, understanding, and skill essential in professional nursing. Studies in the freshman and sophomore years are devoted primarily to the liberal arts and basic sciences; during these years, cocurricular activities are provided to introduce the students to nursing. The focus of the junior and senior years is the nursing major. Transfer students can be readily accommodated in a curriculum of this design.

The overall goal of the curriculum is to enable its students to nurse. Flexibility is seen as essential in order to encourage the unique growth pattern of each student while providing him with the learning experiences which will facilitate his functioning effectively in the practice of nursing.

The distinctive features of the curriculum are:

1. Although every student gains a base in natural and social sciences, any student may choose to develop a science as a secondary area of concentration by building on the lower division courses to greater depth in the junior and senior years.
2. The same pattern as number one above may also be followed in the humanities.
3. Nursing electives in the upper division permit the student to broaden his scope of interest in nursing.
4. Through careful selection of courses (students are guided by faculty advisers), students may build a strong secondary area of concentration as a basis for graduate study in academically oriented programs, or those who find satisfaction in clinical practice may build a base for progression into practice-oriented graduate study.



5. The curriculum is theoretically oriented in the belief that students who learn to select scientific facts and theories from relevant disciplines for application to nursing practice will be able to adapt readily to changing modalities of medical and nursing practice in the future.

Program of Study. Thirty-two courses are required for graduation. The normal course load is four courses a semester. Twelve upper division courses in nursing are required for the nursing major. In order to ensure that every student has some individual and small group learning experiences, students must take a seminar or two preceptorials, discussion sections, or tutorials in each of the first two years. (See pages 10-12, Learning Experiences.)

Lower Division

Natural Science	2 courses (in sequence)
Human Ecology	2 courses
Statistics	1 course
Social Science	3 courses (psychology and sociology and anthropology)
Humanities	1 course
English Composition	1 course
Free Electives	6 or 7 courses
Physical Education*	2 activity courses (no credit)

Upper Division

Theoretic and Scientific Bases for Nursing Practice	2 courses
Development of Nursing Skills and Attitudes	4 courses
Distributive and Episodic Nursing Practice	4 courses
Functional Aspects of Nursing Practice	1 course
Required Independent Study	1 course
Optional Independent Study	Varying Credit
Free Electives	4 courses

Requirements for Degree. To graduate a student must pass a total of thirty-two courses (or an equivalent combination of courses, half-courses, and double-courses), including the approved curriculum. A minimum of fourteen courses must be passed before a student can proceed to the upper division professional curriculum. Of the thirty-two courses required for graduation, twenty-two, including all required nursing courses, must be passed with grades of C or better by students in the class of 1973 and thereafter. A student must pass at least fourteen courses at an advanced level.

A student who fails three or more courses in the first semester of the freshman year or who fails two or more courses in any subsequent semester must leave the University for at least two semesters. Two summer terms in sequence may be counted as a semester. The student's return must be approved by the Dean of the School of Nursing. If the student thereafter fails two or more courses in a semester he will be permanently dismissed from the University. In addition, a student may be dismissed temporarily or permanently by the Dean of the School of Nursing for failing to make satisfactory progress toward graduation. Any student excluded from the University under the provisions of this proposal may at his request have his case reviewed by the Undergraduate Studies Committee of the School of Nursing.



Physical Activity. Satisfactory completion of one year of physical activity is required for graduation unless a student is excused for medical reasons. This requirement would be met by satisfactory completion of one year in appropriate physical education courses or by an alternate form of physical activity approved by the appropriate education department. Pass/fail grades are assigned for performance in required physical education courses and for alternate forms of physical activity. Physical education courses or alternate forms of physical activity do not count among the thirty-two courses needed for graduation.

Residence Requirements. The requirements for the normal and maximum periods of residence for students enrolled in the School of Nursing is the same as for those in Trinity and The Woman's College, see page 13. However, the minimum time that any student may spend in residence (full-time study) at Duke before receiving a Bachelor of Science in Nursing degree is one year.



3

Specialized Programs – Arts and Sciences

Elaborated Major Programs

A student who has chosen a particular field may wish to take more course work in a major or related discipline than is required by his major department. The following programs of study offer a guide in planning this work, especially as it applies to preparation for various professions or professional schools.

Accounting. A student may specialize in public or industrial accounting in his junior and senior years. In either case the following sequence of courses is recommended.

Freshman Year

Mathematics 31 and 32
Management Sciences 50

Sophomore Year

Management Sciences 55, *Quantitative Analysis for Business*
Mathematics 51 or develop competence in computer operations
Management Sciences 120, *Organization Theory*
Management Sciences 130, *Information Systems*
Management Sciences 140, *Operations Research*

Junior Year

Management Sciences 110, *Statistics for Management Decisions*
Management Sciences 210, *Intermediate Theory of Economic Enterprise*
Management Sciences 230, *Controllership*
Management Sciences 231, *Financial Accounting*

Senior Year

Management Sciences 232, *Internal Control and Auditing*
Management Sciences 233, *Federal Income Taxation*
Management Sciences 234, 235, and 236, *CPA Preparation*

Biology—Interdisciplinary Programs. Modern biology meets and joins forces with many related fields. Examples of such interdisciplinary areas are: biomathematics, ecology, genetics, marine science, microbiology, molecular biology, oceanography, and psychobiology. Proper training for these and other areas may require work in two or several science disciplines to such depth that requirements for a conventional unidepartmental major program cannot be met in the allotted time. Any undergraduate who contemplates undertaking a graduate program in an interdisciplinary area involving biology should consult with the directors of undergraduate study of the fields concerned. See p. 12 for procedures for declaring an interdepartmental concentration.

Business Administration. Undergraduate work in business administration, including accounting, is offered in the Department of Management Sciences.

Medieval and Renaissance Studies. The Program in Medieval and Renaissance Studies is divided into four areas of study: fine arts (Art and Music), history, language and literature (Latin, English, French, German, Greek, Italian, and Spanish), and philosophy-religion. A major in this program consists of at least eight courses drawn from the non-introductory courses in these areas, and including three courses in each of two areas. Besides courses already listed in the Medieval and Renaissance periods, provision may be made for independent study in any of the four areas. Students entering the program are urged to acquire a working knowledge of languages—ancient, medieval, or modern—pertinent to their interests. In all cases the student's program will be tailored to his interests and needs. Each program of study must be approved by the Committee on Medieval and Renaissance Studies, after the student's adviser has passed on it. Inquiries concerning the program may be made at the office of the committee chairman, 127 Allen.

Teaching. Duke University is accredited by the National Council for Accreditation of Teacher Education for the preparation of elementary and secondary school teachers. The University's programs are also approved by the North Carolina Department of Public Instruction.

The program for students who intend to teach is designed to prepare for positions either in elementary or secondary school. All prospective teachers must take Psychology 92, 93, 94, or 95, preferably during the sophomore year, and Education 100 or 113, preferably during the junior year. Only students with a *C* average overall and in their major or teaching fields will be admitted to student teaching. Special methods courses should be taken prior to undergraduate student teaching, which may be done in the senior year.

Secondary-School Teaching. Whatever their majors, students preparing to teach must consult an appropriate member of the Department of Education prior to each registration period to assure that they will be eligible to enter the required student teaching program. Students preparing to teach in a secondary school meet certification requirements by qualifying in one teaching field. Prospective secondary-school teachers must major in a subject other than education. Qualification for certification to teach a single science may be sought under either the A.B. or the B.S. degree. Students desiring to major in science education should read carefully the description of that program given below.

Science Education Major. Students intending to teach sciences in secondary school may major in science education. The program meets certification requirements and provides a broad background in several sciences. Early consultation with an adviser in the Department of Education and a selected science department is

required. Five courses in education (100 or 113, 118, 215S, 216, 246 or 276) are required. The Science Education program provides the required two courses in mathematics and laboratory work in at least three sciences, with concentration in one of these. University curriculum requirements account for a maximum of fourteen courses. The remaining eighteen are selected to provide breadth in at least three sciences and must include a minimum of four advanced courses. The general and professional courses required for certification may be met in part both by the University curriculum distribution and within the eighteen courses devoted to concentration.

A major in science education leads to a A.B. degree within the normal thirty-two course limit. Students wishing to have the B.S. degree may expect to take more than thirty-two courses. The normal number of courses may be reduced by advanced placement or proficiency tests in English and foreign language.

Elementary Education Major. This program is designed for those students who desire to meet the certification requirements for teaching in the elementary school.

Required General Education Courses

These courses may be used to fulfill the general education requirement for the A.B. degree.

English	1 course or by examination
Foreign language	4 courses or by examination
Biological science	2 courses
Mathematics 31	1 course
History 91-92	2 courses
Political Science 61	1 course
Economics 115 or 120	1 course
Literature	1 course
Psychology 92, 93, 94, or 95	1 course

Required Specialized Subject Matter Courses

Physical Education 102	½ course
Health Education 134	½ course
Music Education 151-152	1 course
Education 161-162	1 course
Education 105	½ course
Education 106	½ course
Education 107	½ course
Education 108	½ course

Required Professional Courses

Education 100 or 113	1 course
Education 118	1 course
Education 195S	½ course
Education 196	1½ course

A major in elementary education must include the concentration of at least six courses in subjects commonly taught in elementary school, chosen from one of the divisions—humanities, natural science, or social science. The concentration may include courses from the general education requirement.

Preparation for Graduate and Professional Schools

Many graduate and professional schools require special tests for students seeking admission. Information regarding the test requirements should be obtained from

the catalogues of the schools to which the student plans to apply. The University Counseling Center has available applications for required graduate and professional testing programs.

Graduate Schools of Arts and Sciences. The student who plans to enter a graduate school of arts and sciences for advanced study should consult an adviser in the field of the proposed advanced study concerning suitable preparation. Most graduate schools have definite requirements in foreign languages for all students. Candidates for the degree of Doctor of Philosophy may be required to pass reading examinations, usually in German and French. In some cases other languages may be substituted. As soon as practicable, the student should ascertain the requirements of the particular graduate school he desires to enter.

Graduate Schools of Engineering. Students interested in the possibility of graduate work in engineering should consult the Dean of the School of Engineering or the director of graduate studies in one of the four engineering departments. Most engineering graduate schools require that a candidate have the equivalent of a Bachelor of Science in Engineering degree, but it may be possible for students in the natural and social sciences to obtain conditional admission if they have a sufficient background in mathematics and a desire to apply science to the solution of problems.

Graduate Schools of Business Administration. Students seeking advice concerning preparation for entrance to a graduate school of business administration may consult the Department of Management Sciences. Many graduate programs in business administration are designed specifically for students with little or no undergraduate work in business.

Some schools require at least one year of calculus for admission. Additional courses in mathematics can be very helpful, especially linear algebra, probability, statistics, and advanced calculus. Other areas in which work can be of special value are philosophy of science and formal logic; one or more of the behavioral sciences, economics, and the physical sciences; and engineering.

Medical and Dental Schools. Students planning to enter a medical or dental school should arrange their programs of study from the first semester so as to include those courses required by the professional schools of their choice. These courses usually include at least one year of English, two and a half years of chemistry, and one year each of biology, mathematics, and physics. At Duke University the courses normally taken are English 1 and one or more literature courses; Chemistry 1, 2, 61, 151, and 152; Biology 11-12 or 14; Mathematics 31-32; and Physics 51-52. Most professional schools require ninety semester hours of college credit before consideration for admission. Because individual medical and dental schools strongly recommend or, in some cases require specific courses in addition to those listed above, it is wise for the student to be fully aware of any additional requirements established by the professional school of his choice. This applies in particular to schools of veterinary medicine, many of which require or recommend additional courses. A number of medical schools require a foreign language.

The student should plan his program to meet major and graduation requirements. He may elect to major in the department of his choice, but should discuss his program with the premedical adviser, his major adviser, and his academic dean.

Law Schools. Students who plan to prepare for law school may select their major work in any field. They have often chosen from among the following courses: Management Sciences 130; Economics 51, 52; English 55, 56; History 1, 2 or 51,



52, 105, 106; Philosophy 41 and 48; Political Science 61; Sociology 91, 92; Engineering 169, 170.

For a fuller discussion of undergraduate preparation for the study of law, students should refer to the *Bulletin of the School of Law*.

Theological Schools and Religious Work. The student contemplating theological study should correspond at the very earliest opportunity with the school or schools to which he intends to apply and with the authorities of his church in order to learn what will best prepare him for the specific program he expects to enter. He will be likely to find under the guidance of the seminary that he should consider the following subjects:

English language and literature; history, including non-Western cultures as well as European and American; philosophy, particularly its history and its methods; natural sciences, both the physical and the life sciences; social sciences, where psychology, sociology, and anthropology are particularly appropriate; the fine arts and music, especially for their creative and symbolic values; Biblical and modern languages; religion, both in the Judaeo-Christian and in the Near and Far Eastern traditions.

Some seminaries require Greek or Hebrew for admission, and many advanced biblical courses are offered in the original tongues; modern languages have a less direct but immensely educative role and are required at the graduate studies level.

It is the understanding gained in these fields rather than the total of credits or semester hours which is significant.

In many seminaries students who have been well prepared in religion and equipped with the tools of theological study will be set free, not to complete their theological course more quickly, but rather to pursue more advanced studies. The principle constantly to be kept in mind is not that of satisfying paper regulations and minimum requirements, but of making the most of opportunities for education.

Professional Combination Courses

The provision whereby a senior may elect the work of the first year in a professional school of the University shall apply solely to eligible students in Trinity College or The Woman's College. The privilege of completing a combined course for the degree is conditioned upon admission to the professional school at the close of the junior year. A student thus admitted registers as a first-year student in the professional school.

Forestry. Preprofessional training in forestry is offered to men and women who are planning careers in professional forestry. A student who has completed a three-year program of studies in liberal arts and sciences and who has maintained a satisfactory academic record may, with the approval of the dean of his college and the School of Forestry, transfer to the School of Forestry. Upon the satisfactory completion of the forestry courses ordinarily required in the first year in the School of Forestry (see *Bulletin of the School of Forestry*), the student will be eligible for the degree of Bachelor of Science from Duke University.

The professional degree of Master of Forestry may be earned upon satisfactory completion of three additional semesters in the School of Forestry.

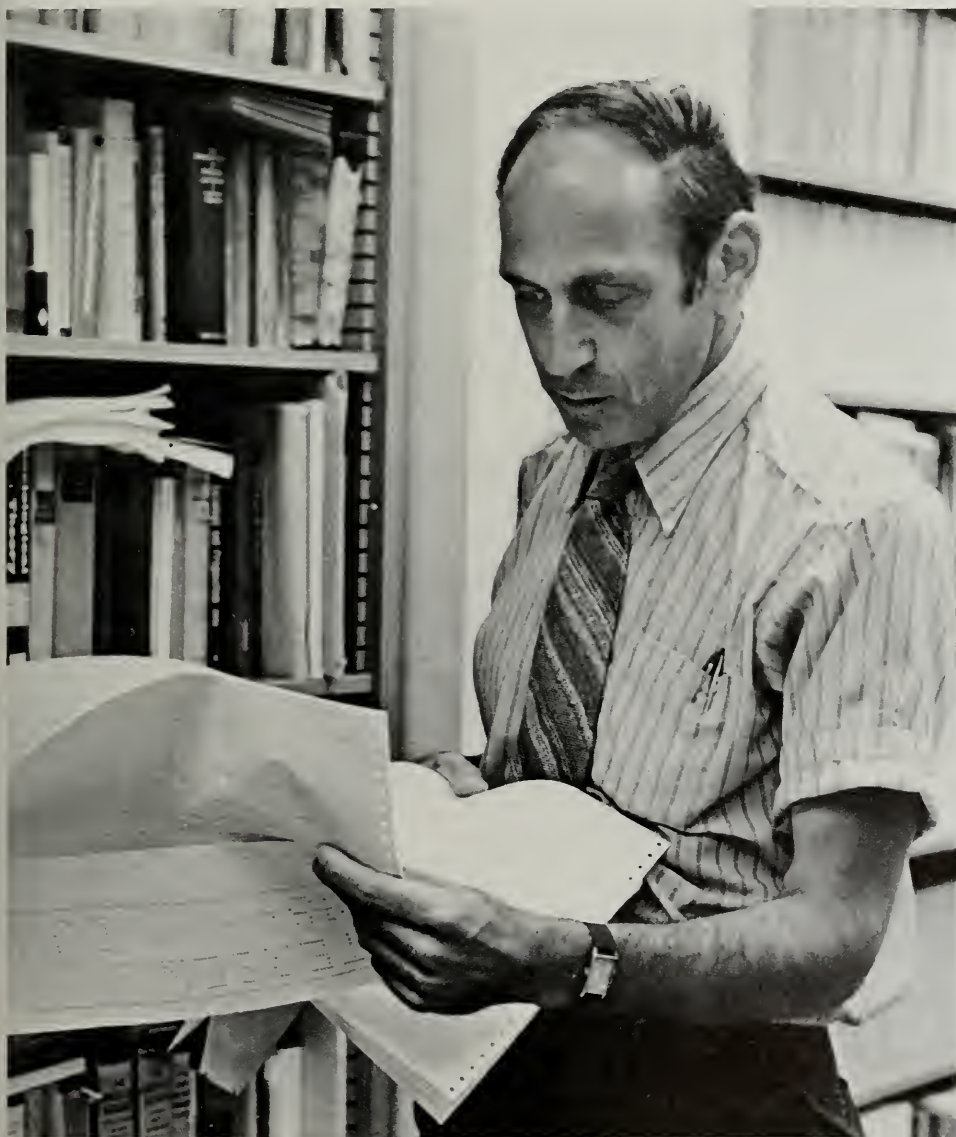
Students interested in this combined course are encouraged to consult with the Dean of the School of Forestry.

Law. A student with a distinguished academic record who has completed three years of undergraduate work, or is within two semesters of graduation, including

the course requirements for the A.B. degree and work of the junior year in his major and related fields, may, with the approval of the dean of his college, transfer to Duke University School of Law and be eligible for the A.B. degree from Duke University upon completion therein of the work of the first year.

However, study in the Law Combination Program is contingent upon admission to the Duke University School of Law which usually requires an undergraduate degree as a prerequisite for admission. Only in unusual occasions of proved academic excellence will the Law School admit a student after the completion of his junior year.

It is understood that this program shall apply solely to eligible undergraduates who have completed three years in residence in Duke University, and that not less than the full first-year's work of the Law School will be acceptable for credit toward the bachelor's degree.





4

Academic Procedures and Information

Advanced Placement

Demonstrated proficiency on certain tests and record in previous educational experience are the criteria employed to determine a student's qualifications for certain advanced courses, with acceptable test scores being the basic criterion. Scores on the tests discussed below are used in granting placement in such courses.

CEEB Advanced Placement Program (APP) Examinations. Scores of 3, 4, or 5 on CEEB Advanced Placement Program Examinations are bases for placement in advanced courses in botany, chemistry, English,* French, German, history, Latin, mathematics, physics, Spanish, and zoology. A student presenting such a score and desiring to continue in the same subject matter at Duke may request an advanced course for the fall semester. (In selecting a course, see the section on major requirements of the appropriate department. Freshmen requesting advanced courses in the summer preregistration procedures will be notified of their placement in the late summer by mail or during Freshman Week.)

Any student who has earned a score of 3, 4, or 5 on a CEEB Advanced Placement Program Examination is approved for placement and may be considered for credit in the appropriate subject: botany, chemistry, English, French, German, history, Latin, mathematics, physics, Spanish, and zoology. For those students presenting scores of 3, credit will be determined, with the approval of the academic department concerned, no earlier than at the end of the first semester following completion by the student of an advanced course in that department with a grade of C or better. Ordinarily, the advanced course must be taken by the end of the sophomore year. (Course credit may be granted for one or two semesters in each subject area in which examination is offered in the Advanced Placement Program.)

In the case of French, German, Latin, and Spanish, APP scores of 3, 4, or 5 may result in placement in courses at the 100-level; approval of the director

*The requirement in English composition, however, cannot be waived on the basis of these scores.

of undergraduate studies or supervisor of freshman instruction in the appropriate department is required before final placement is made. Advanced courses at the 100-level or above satisfy distributional requirements in the humanities.

CEEB Achievement Tests. Scores on CEEB Achievement Tests are the basic criteria for placement in French, German, Spanish, Latin, and mathematics. The following tables will assist students in making reasonable course selections in the subjects indicated.

French		German		Spanish	
<i>CEEB Achievement Scores</i>	<i>Course Placement</i>	<i>CEEB Achievement Scores</i>	<i>Course Placement</i>	<i>CEEB Achievement Scores</i>	<i>Course Placement</i>
200-396	French 1*	200-365	German 1*	200-453	Spanish 1*
397-556	French 63	366-571	German 63	454-623	Spanish 63
557 plus	French 91	572 plus	Third year	624 plus	Spanish 91

Latin		Mathematics	
<i>CEEB Achievement Scores</i>	<i>Course Placement</i>	<i>CEEB Achievement Scores</i>	<i>Course Placement</i>
200-529	Latin 1*	500-800	Mathematics 31†
530-639	Latin 63	760-800	Mathematics 31X upon request of the student
640 plus	Latin 91		

*The first year of a language, including Russian, may not be taken for credit by a student who has completed more than two years of that language in secondary school. Some exceptions may be granted in the case of German, with permission of the Director of Undergraduate Studies in that department.

†A student with scores below 500 must obtain the permission of his freshman adviser to take Mathematics 31.

Students in The Woman's College and Trinity College qualifying for courses in mathematics above Mathematics 31 will not be granted credit for courses by-passed unless they also present appropriate scores on APP tests.

Waiver of English Composition Requirement. Students who present a score of 700 or higher on the CEEB English Composition Achievement Test are excused from the course in English composition required for graduation, but do not receive course credit for English 1.

CEEB College Placement Tests. The CEEB College Placement Tests in French, German, Latin, and Spanish should be taken in Freshman Week by (1) those students who desire to continue in the language but have not taken the CEEB Achievement Test, and by (2) those students who, having taken the CEEB Achievement Test, wish to challenge the score obtained on that test for the purpose of qualifying for a higher level language course.

The CEEB College Placement Tests in French, German, Latin, and Spanish are administered at the end of each semester and at the close of the first term of the summer session for the convenience of those students who wish to demonstrate their foreign language proficiency by this means. Ordinarily students may take this examination only twice while enrolled at Duke. Exceptions to this rule must be approved by the student's academic dean. The taking of a CEEB College Place-

ment Test by students at the time of their matriculation at Duke, for the purpose of course placement, will not be counted as one of the two opportunities allowed.

All freshmen who plan to take mathematics at Duke during the fall semester, and who did not submit the CEEB SAT score or CEEB Achievement Test score in mathematics, must take the CEEB College Placement Test in mathematics. Students who have been denied placement in a mathematics course, or who have been placed in Mathematics 31, may take the CEEB College Placement Test to qualify for a higher course placement. Students who have been placed in Mathematics 31 and who wish a higher course placement need not take the CEEB College Placement Test but should contact the Director of Undergraduate Studies of the Mathematics Department.

Students in The Woman's College and Trinity College who qualify for a foreign language at the 91-level or higher on the basis of their score on a CEEB College Placement Test will not receive credit for courses thus bypassed. Such students may wish to discuss with the appropriate director of undergraduate studies the possibility of enrollment in a course at the 100-level. Literature courses on the 100-level satisfy distributional requirements in the humanities division.

Placement in Russian. Students who wish to continue in Russian at Duke should see the Director of Undergraduate Studies in that department. In the case of Russian, neither CEEB Achievement Test scores nor CEEB College Placement Test scores have been sufficiently validated to serve as criteria for placement. Therefore, the Russian department offers a departmental examination which is used in conjunction with other criteria for placing students at the appropriate course level.

Reading-Out of Introductory Courses

Students of demonstrated academic ability may be granted the option of "reading-out" of an introductory or prerequisite course in order to allow them to advance at their own pace to upper-level work. No course credit may be earned by "reading-out." Any student interested in reading during the summer to bypass an introductory or prerequisite course must be recommended by his dean and secure the permission of the department concerned. Reading for a course and auditing are mutually exclusive procedures. A proposed program of reading should be approved by the director of undergraduate studies in the department in which the work will be done. On passing a qualifying examination prepared by the department, a student may be certified for advanced course work in the area. On completion of an advanced course, an entry will be made on his permanent record that he has passed a qualifying examination but no course credit is awarded. Interested students should request further information from their respective dean's offices.

Registration

Preregistration. New students preregister by mail preceding matriculation for their first college semester. Preliminary registration materials are sent in May and November to all entering freshmen and in July and November to all transfer students. By becoming familiar with these materials the student can plan an academic program. To accomplish preregistration, course cards sent to each student are filled out and returned to the office of the dean of the appropriate college. It is understood, of course, that entering students may change some course selections after they have received counsel during Orientation.

Continuing students are expected to preregister at specified times for each successive semester. Prior to preregistration each student receives special instructions and registration materials. He prepares a trial course program and presents it at an appointed time to his adviser or to a faculty member designated to assist him in reviewing it. This approved schedule is then presented at preregistration.

Students who contemplate teaching in elementary or secondary schools should consult an appropriate member of the Department of Education prior to each preregistration period to ensure that they are meeting requirements for certification (many states have unique requirements) and they will have places reserved in the student teaching program.

Those who preregister at a time later than the day specified in the University calendar are subject to a \$10.00 fine. Students who fail to preregister are automatically withdrawn and must apply for readmission if they wish to return; they also forfeit their \$50.00 registration deposit unless they indicate at the time of preregistration their intention not to continue in the University the following semester.

Semester Opening. Students are expected to report to the appropriate college office at the beginning of each semester to obtain a semester enrollment card. Any student who is unable to do this should notify his academic dean that he will be late in arriving. Failure to report, or to account beforehand for one's absence, entails a loss of registration in courses. An official enrollment is required for admission to any class.

On Registration Day or during the first two weeks of classes, changes in the schedule for which a student is preregistered can be made. Course changes initiated by the student entail a fee of \$1.00 per change.

Course Changes After Classes Begin. Except in the School of Nursing and the School of Engineering, students may drop and add courses during the first week of classes at their own discretion. During the second week, they may drop courses at their own discretion, but the signature of the appropriate instructor will be required for adding courses. Students are reminded that it is their responsibility to be certain that their course load conforms with the academic requirements. Within the School of Nursing and the School of Engineering the signature of the adviser is necessary for dropping or adding courses after registration.

Students may drop a course without penalty up until the time mid-semester grades are assigned if clearly carrying a course overload. Factors such as poor health or necessary outside work are also considered in permitting withdrawal from courses without penalty. A *W* is entered on the permanent record in lieu of a grade in all cases where withdrawal without penalty is approved. After the time limit has expired, withdrawal from any course will ordinarily result in a grade of *F*. Courses discontinued prior to mid-semester without approval will also be assigned an *F*.

Course Load and Eligibility for Courses

The normal course load each semester is four semester-courses. This is the minimum program ordinarily permitted. To take fewer than four or more than five semester-courses in any semester, a student must have the approval of his academic dean. No student, however, may take more than six courses in any semester.

Ordinarily a senior may not elect for credit toward graduation any courses open primarily to freshmen. Juniors may elect only one such course. The rules established by the Graduate School provide that juniors and well-qualified sophomores may enroll in a 200-level course if they have earned an overall *B* average

and have obtained the written consent of the instructor, as well as that of the director of graduate studies in the departmental concerned. Sophomores must have also the approval of the director of undergraduate studies.

Seniors who at the beginning of a semester lack no more than three semester courses for the fulfillment of the requirement for the A.B. or B.S. degree may enroll in graduate courses for a maximum total program of five semester courses. The permission of the Dean of the Graduate School is required.

Course Audit

With the written consent of the instructor, a full-time degree student is allowed to audit one or more courses in addition to the normal program. With the consent of the instructor and the Registrar, alumni may audit undergraduate courses at the usual auditing fee. After the first two weeks of classes in any semester, no student classified as an auditor in a particular course may take the course for credit, and no student taking a course for credit may change classification to an auditor. A student may not repeat for credit any course he has previously audited. Auditors submit no daily work, take no examinations, and receive no credit for courses.

Independent Study

Independent study enables a student to pursue individual research and reading in a field of special interest subject to the supervision of a member of the faculty. A student—with approval of his adviser, the instructor, and the director of undergraduate studies of the instructor's department—may enroll in independent study for any semester of his enrollment at Duke.

House Courses

House Courses are initiated and organized by students within given residential units. They are generally, but not necessarily, interdisciplinary in nature. Each course must be sponsored by a faculty member in the arts and sciences and must be approved by the department of that faculty member as well as by the Committee on Courses of the Undergraduate Faculty Council if students are to earn credit for the course. Ordinarily House Courses are numbered 179 or 180 (fall and spring, respectively) and carry half-course credit. Grades are submitted on a pass-fail basis. Students are invited to speak with the Secretary of the Committee on Courses for further details.

Advanced Courses and Placement Programs

Advanced courses are those above introductory level. The numbering of such courses, however, varies among the several departments. An undergraduate in The Woman's College or Trinity College should not assume that the advanced courses to which he may be admitted as a result of the College Board Advanced Placement Examinations (APP) or Duke placement examinations necessarily qualify as "advanced courses" of the type required for graduation. See page 12 for the requirement on Advanced Work.

The CEEB Advanced Placement Program Examinations (APP) and the Duke placement tests are used to decide placement in various courses above the introductory level. See above pages 35-37, for descriptions of the procedures leading to advanced placement on the basis of CEEB and Duke placement examinations. Only the APP Examinations may lead to semester course credit toward graduation for the course or courses omitted and to the fulfilling of *requirements*. (See page 10,



Proficiency in English Composition, for an exception.) The departmental directors of undergraduate studies and the University Registrar are charged with the responsibility for evaluations leading to placement in courses above the introductory level.

Course Credit

The unit of credit for academic work undertaken in the colleges is the semester-course, which ordinarily consists of three to four hours of instruction time each week of the semester. Double-courses, half-courses, and a few quarter-courses are recognized. Credit for thirty-two semester-courses is required for graduation.

Transfer Credit. Transfer credit is evaluated from regionally accredited, degree-granting institutions. Courses taken away from Duke in which grades of less than C- have been earned are not accepted for transfer credit. Credit for work completed at other institutions will be determined in relation to the curriculum requirements of the college in which the student enrolls at Duke.

Credit for courses at the introductory level in science, mathematics, or foreign language taken at a junior college will be evaluated by the departments concerned.

Students who transfer to Duke may receive credit for a maximum of two years of work at other institutions of approved standing. No credit is given for work completed by correspondence, and credit for no more than two semester-courses is allowed for extension courses.

Declaration of Major or Interdepartmental Concentration

Each student must declare a major or interdepartmental concentration in the office of his academic dean well before preregistration in the second semester of the sophomore year so that a Check Sheet, showing his progress toward fulfilling degree requirements, can be prepared and presented to the appropriate department for advisory purposes. Any student who declares an interdepartmental concentration must indicate the department taking administrative responsibility for academic advising. After declaring the major or concentration, the student consults a departmental adviser each semester during the announced preregistration period.

An interdepartmental concentration (see page 12) may be declared only with the approval of the directors of undergraduate studies in the departments

concerned. The student's program of proposed course work, listing at least three courses beyond the introductory level in each of two or more departments, must be approved in writing by the directors of the two or more departments and presented to the student's academic dean. The proposal should include a suggested title of the interdepartmental study as it should appear on the student's permanent record. When a student declares an interdepartmental concentration in the office of his academic dean, he should be prepared to identify his second and third divisions.

Changes in departmental majors or interdepartmental concentrations must be registered in the office of the student's academic dean.

Declaration of a Second Major

A student may declare a second major to be recorded on his permanent record. A second major should be declared in the appropriate academic dean's office *before* a student preregisters for his final semester.

Class Attendance and Excused Absences

Responsibility for class attendance rests with the individual student. He is expected to attend classes regularly and punctually and must accept the consequences of failure to attend. An instructor is privileged to refer to the dean of the appropriate college for suitable action students who in his opinion are causing their work or that of the class to suffer because of absences. When excessive absences result in a student's failure to carry a normal course load, the dean, after a conference with the student, will determine whether the student may continue his enrollment in the college.

Absences from required classes and tests ordinarily are excused only for illnesses certified by a proper medical official of the University, and for authorized representation of the University in out-of-town events. Officials in charge of groups representing the University in such events are required to submit names of students to be excused to the appropriate dean's office forty-eight hours before absences are to begin.

Final Examinations and Excused Absences

It is University policy that a final examination be given in every course and that these examinations may not be more than three hours long. Final examinations are officially scheduled at the end of each semester by the University Schedule Committee, and no changes may be made in the schedule without the approval of the committee. Generally final examinations are scheduled according to the week-day and hour at which the course meets during the semester.

Absences from final examinations are excused by the appropriate academic dean only in very exceptional circumstances, such as illness certified by a medical official of the University or other conditions beyond the control of the student. A student who misses a final examination must notify his dean within forty-eight hours after the scheduled time of the examination. Failure to so notify and to present an acceptable reason for his absence from the examination will result in the student's receiving an *F* in the course.

Grading and Grade Requirements

Final grades on performance in academic work are sent to students and parents, or guardians, after the examinations at the end of the fall semester. At the

close of the spring semester, grades are mailed to the student's home address. Mid-semester advisory grade reports for freshmen are issued each semester.

Passing Grades. Passing grades are *A*, exceptional; *B*, superior; and *C*, satisfactory. In the School of Engineering, *for courses taught by the School only*, passing grades are *A*, exceptional; *B*, superior; *C*, average; and *D*, low pass. A passing grade in all colleges and schools may be modified by a plus or minus. A *Z* may be assigned for the satisfactory completion of the first semester of a year course. The earned grade for a two-course sequence may be withheld by the instructor until the grading period for the second course of the sequence.

Failing Grades. A grade of *F* or *U* (see pass/fail option below) indicates that the student has failed the course and that in order to receive credit for it he must reregister for the course and repeat the work in class.

Pass/Fail Grading Option. With the consent of the instructor and faculty adviser, a student who has declared a major may choose to be graded on a pass/fail basis in one elective, non-major course each semester or summer session. In addition, with the consent of the instructor, adviser, and director of undergraduate studies, a student may take for pass/fail credit courses in independent study or internship in any department including that of his major. Certain internships and small group experiences are offered only on a pass/fail basis.

A student enrolling in a course on a pass/fail basis completes all the work of the course but receives either a pass (*P*) or fail (*U*) grade in lieu of a standard grade. After the first week of classes in any semester, no student may change his status to or from a pass/fail basis. A pass grade may not subsequently be converted to a regular letter grade nor may the course be retaken on a regular credit basis.

For the effect of the election of the pass/fail option in determining honors, see Eligibility for Academic Honors, page 43.

Grades When Absent from Final Examination. In all cases in which a student is absent from a final examination, he receives an *X* instead of a final grade. If he does not present an acceptable explanation for his absence to the appropriate dean's office within forty-eight hours after the scheduled time of the examination; the *X* is converted to an *F*. Only the academic dean is authorized to excuse the absence of a student from a final examination. If the absence is excused, the student arranges with the dean and the instructor for a make-up examination. For purposes of determining if a student satisfies continuation requirements, an *X* is counted as a failing grade. An *X*, not cleared by the end of the semester following the examination missed, is converted to an *F*.

Grades for Incomplete Work. If because of illness or other emergency a student's work in a course is incomplete, he may receive an *I* for the course instead of a final grade. Incomplete courses must be completed before the close of the succeeding semester; otherwise, the *I* is converted to an *F*. Seniors are expected to complete all courses before graduation. In case a student whose work is incomplete is also absent from the final examination, he receives an *X* for the course.

For the purposes of determining if a student satisfies continuation requirements, an *I* is counted as a failing grade.

Commencement

Degrees are awarded in May at commencement exercises to those who have completed requirements at the end of either regular semester of the academic year.

Those who complete degree requirements at the end of a summer term become eligible to receive diplomas dated September 1, but no commencement exercises are held for such graduates.

Eligibility for Academic Honors

Dean's List. In recognition of academic achievement, freshmen, sophomores, and juniors who carry a normal academic load and earn a *B* average or higher in the two semesters of an academic year are placed on the Dean's List if the following additional requirements are met:

1. Six semester-courses must be presented in which grades other than *P* have been awarded.
2. No student receiving one or more incompletes or failing grade within the academic year shall be placed on the Dean's List.

Class Honors. Students in the freshman, sophomore, and junior year who carry a normal academic load and earn a *B+* average on all work for the year are eligible for Class Honors provided the following conditions are also met:

1. Six semester-courses must be presented in which grades other than *P* have been awarded.
2. No student receiving one or more incompletes or failing grade within the academic year shall be eligible for Class Honors.

Graduation Honors. Full-time or part-time students who earn the following averages for all work taken at Duke are graduated with honors: a *B* average earns a degree *cum laude*; a *B+* average earns a degree *magna cum laude*, and an average of *A-* or above earns a degree *summa cum laude*.

Graduation With Distinction. Independent study and other honors opportunities are available under the title *Graduation with Distinction* in the majority of the academic departments for students in Programs I and II. Departments or interdepartmental honors committees may invite students at the end of the sophomore or junior year to enter the Graduation with Distinction Program. To be eligible, students must show promise of achieving by the time of graduation at least a *B* average in the major field. After participation in a seminar in the junior or senior year, and/or a directed course of reading, laboratory research, or other independent study, the student must present the results of his individual research and study in a distinguished piece of writing. The student's achievement, including the paper, is assessed by a faculty committee. If the student has at least a *B* average in the major field, the committee may recommend that the student be Graduated with Distinction in his major field. Interested students should consult the director of undergraduate studies in his department.

In the case of a student engaged in an interdisciplinary program the student must attain an overall *B* average for his courses taken in the departmental areas of his concentration or special study; his achievement is assessed by an interdepartmental honors committee established by the directors of undergraduate studies in the departments concerned.

Enrollment for the Duke Summer Session

The summer session of the University makes available to Duke undergraduates and students from other universities and colleges a notable program of instruction in many fields of knowledge, both academic and professional.

Undergraduates of Duke University who plan to attend one or more terms of a Duke summer session, or who plan to take a course in independent study during the summer, should preregister if possible at the same time they preregister in the spring for the fall semester. Instructions are included in the preregistration packet distributed to Duke students in early April at which time the summer session bulletins also are available. Enrollment after the spring preregistration period should be initiated in the office of the appropriate academic dean. Undergraduates in other universities or colleges who seek transfer credits should apply directly to the Director of the Summer Session, Duke University, Durham, North Carolina 27706.

The summer session of 1972 will include three terms: Term I, May 15 to June 16; Term II, June 19 to July 21; Term III, July 24 to August 25.

Distinctive features of summer session instruction are provided in the various conferences sponsored by several of the departments and by a program in marine biology offered at the Duke Marine Laboratory, Beaufort, North Carolina. See *Bulletin of the Summer Session* for 1972.

Changes in Status

Withdrawal and Readmission. A student who wishes to withdraw from college must give official notification to his academic dean. Withdrawals at student initiative prior to the Thanksgiving recess in the fall semester or prior to April 15 in the spring semester are coded as voluntary, and a *W* is entered in lieu of a grade for each course. Voluntary withdrawals after these dates are permitted only in the event of emergencies beyond the control of the student.

Applications for readmission are made to the appropriate school or college. Each application is reviewed by officers of the school or college to which the student applies. A decision is made on the basis of several criteria including the applicant's academic record at Duke, his prospects of completing requirements for graduation, his citizenship record at Duke, evidence of his increasing maturity and discipline, the degree of success attendant upon his activities during the time away from Duke, and finally the applicant's relative standing among the group of students applying for readmission.

Applications for readmission must be submitted by November 15 for admission in January, and by July 15 for admission in September. For readmission to The Woman's College in September, however, it is advisable to apply by March 1 since dormitory spaces are normally assigned by April 15.

Leave of Absence. An upperclass student in good standing may apply in writing to his dean to take a leave of absence for one or two semesters. He must apply before the end of the fall semester for a leave of absence during the spring semester, and before July 15 for a leave of absence during the fall semester. If the leave is approved, the student must keep his dean informed of any change of address. Ordinarily no leaves are approved for residence in the Durham area.

Preregistration materials will be mailed to all students on leave of absence. A student failing to preregister will be withdrawn from the University and will have to apply for readmission.

Transfer Between Duke Schools and Colleges. A student in good standing may transfer from one Duke undergraduate school or college to another upon written application and with the approval of the officers of the undergraduate colleges involved. The review of a student's request to transfer will involve consideration of his general academic standing, citizenship record, and relative standing among the group of students applying for transfer. The college to which transfer is sought

will give academic counseling to a student as soon as his intention to apply for transfer is known, although no commitment will be implied in doing so. A request to transfer should first be made to an academic dean in the college in which the student is presently enrolled. Subsequent procedural details will then be given.

Full-Time and Part-Time Degree Status. A regular candidate for a degree who wants to change from full-time to part-time status, or from part-time to full-time status, must consult his academic dean. For special reasons approved by the dean, a full-time degree student who is qualified to continue in his college may register in a part-time degree status for no more than two courses.

Resident and Nonresident Status. Men other than freshmen who wish to live off-campus should receive authorization in the Office of the Dean of Men. Senior, junior, and sophomore women who wish to live off-campus must register their intention in the Office of the Dean of Women, The Woman's College, or with the Dean of Student Affairs, the School of Nursing.

If a student in The Woman's College marries while enrolled, a written request for a change to nonresident status must accompany her statement of marriage to the Dean of Women.

Nondegree to Degree Status. A nondegree student must apply to the Office of Admissions for change in status to that of a degree candidate.

Study Elsewhere

Concurrent Enrollment. A student enrolled at Duke may not concurrently enroll in any other school or college without special permission of the appropriate academic dean. See, however, the statement regarding the reciprocal agreement with the Consolidated University of North Carolina and North Carolina Central University at Durham.

Summer Schools—Other Colleges or Universities. Summer School approval forms for courses to be taken at institutions other than Duke may be obtained from the offices of the deans. A student wishing to transfer credit for summer work elsewhere at an accredited college should obtain approval of his course selections prior to taking the courses. He should present a summer catalog of the chosen institution to his dean and to the director of undergraduate studies in each discipline in which he proposes to take a summer course and request their approval.

Summer courses may be taken at an accredited junior college only if completed prior to the conclusion of the student's sophomore year at Duke. In general, students may transfer credit for a maximum of four courses each summer, as long as the residence requirement for graduation is met.

Study Abroad. A Duke student may receive transfer credit for approved work completed at foreign universities. A student may also study in approved programs sponsored by Duke or by other American colleges and universities.

Duke, at present, offers five programs in cooperation with other universities. Grades earned in these programs are recorded on the student's official Duke record. Students accepted may study at:

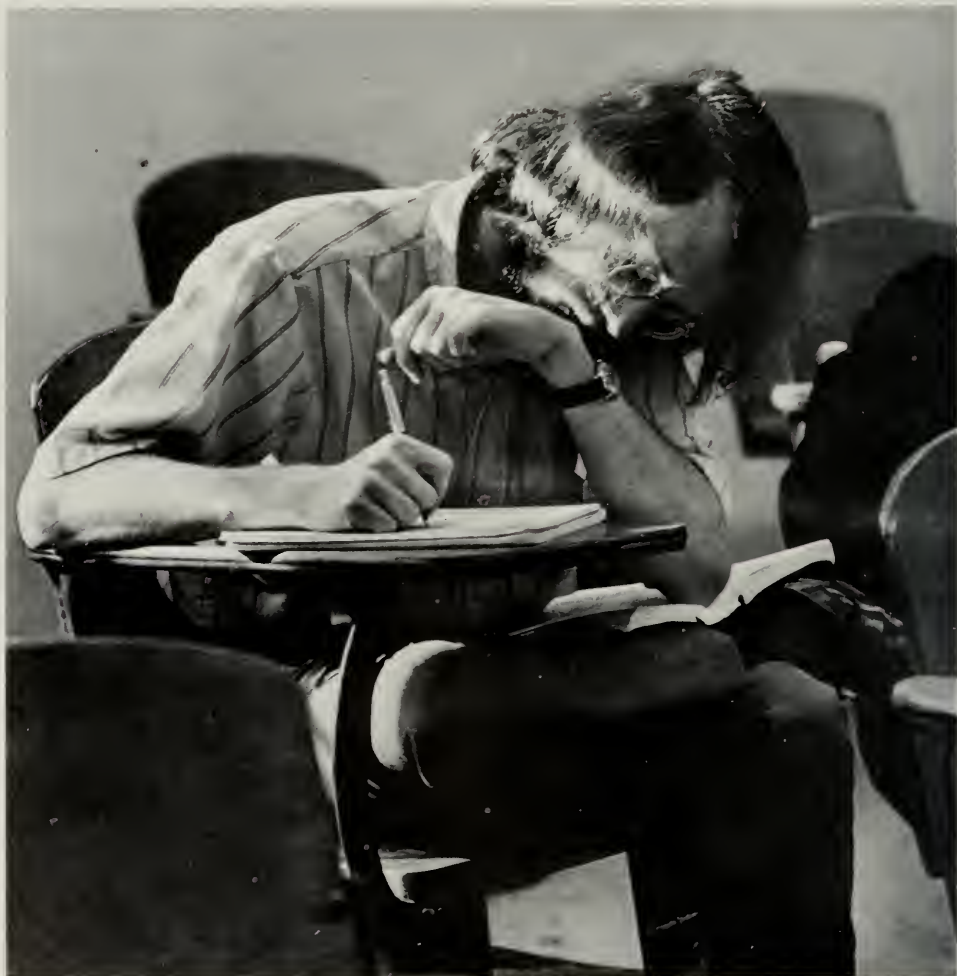
Aix-en-Provence, France. Courses are given during both the fall and spring in French language, art, philosophy, and literature. Completion of French 64, or equivalent, is required prior to departure. This program is administered through Vanderbilt University.

Madrid, Spain. Work is given in Spanish language, literature, art, music, and history for either the fall or spring. Completion of Spanish 64, or equivalent, is required prior to departure. This program is under the direct administration of Vanderbilt University.

Rome, Italy. As one of the participating members in the intercollegiate Center for Classical Studies in Rome, Duke University nominates majors in classical studies for admission to a semester's work at the Center, usually in the junior year. Instruction is offered in Greek, Latin, ancient history, and ancient art and archeology. Some scholarship help is available.

Munich and Freiburg, Germany. Admission to these programs entails matriculation at the University of Munich or Freiburg. The student must therefore, meet their admission standards. Courses are taken in German language, literature, art, and history through Wayne State University, while additional courses are taken at the German universities.

Duke University has sponsored summer programs abroad in France, Germany, Israel, Italy, and Spain. Students are selected competitively and have an opportunity to earn credit and grades for two courses.



Leaves of absence from the University are granted to students who study abroad. When possible, arrangements are made for them to preregister while abroad for the semester in which they plan to return. A student who wishes to transfer credit for study abroad should be guided by the following provisions established by the faculty and administered by the Committee on Study Abroad.

The student should:

1. have a scholastic average of at least *B-*;
2. obtain provisional approval to study abroad from his academic dean and the director of undergraduate studies in his major department;
3. receive certification, when applicable, from the foreign language department concerned that he can handle adequately the language of the country where he will study;
4. obtain, before leaving Duke, approval of each course by the appropriate director of undergraduate studies and approval of the program by his academic dean.

Usually work to be considered for transfer credit must be done in the language in which courses are normally given in the institution attended. Ordinarily four semester course credits can be transferred per semester for a satisfactorily completed full-time program. Information regarding study abroad may be obtained from the academic deans. In all cases they must be informed in advance about plans for study abroad if credit for the work is desired.

Other Information

Release of Student Records. No confidential information contained in student records (academic or otherwise) is released to non-University persons or to unauthorized persons on the campus without the consent of the student. Consent is evidenced by each student's signing a form which authorizes the release of personal data. The form may provide for the release of information to one or more persons or agencies only, or it may be a blanket release. Blank forms to authorize or revise the permission are available in the offices of the deans.

Identification Cards. Undergraduate students are issued two-part identification cards which they should carry at all times. The cards are the means of identification for library privileges, university health services, athletic events, and other University functions or services open to them as University students. Students will be expected to present their cards on request to any University official or employee.

The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of this card immediately to the Registrar's Office. The cost of a new ID card is \$5.00.

Conduct of Students. Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University.

Students should also refer to the *Bulletin of Information and Regulations, the Undergraduate Colleges and Schools*.



5

Cooperative Programs

Reciprocal Agreements with Neighboring Universities

Under a plan of cooperation between Duke University and the Consolidated University of North Carolina (i.e., U.N.C. at Chapel Hill and N.C.S.U. at Raleigh), and between Duke University and North Carolina Central University in Durham, a student regularly enrolled in Duke University, and paying full fees, may enroll for one approved course per semester at one of the institutions in the cooperative program. If the student takes two or more courses during a summer at Duke, one of the courses may be taken in one of the neighboring institutions under this plan.

Approval forms for courses to be taken at neighboring institutions may be obtained from the offices of the academic deans at Duke. Ordinarily, only those courses not offered at Duke will be approved. The student pays a normal registration fee of \$2.00 plus any other special fees required of students at the host institution. All inter-institutional registrations involving extra-fee courses will be taken at the expense of the student and will not be considered a part of the Duke University tuition coverage.

Center for Continuing Education

By special arrangement, a limited number of *nondegree* undergraduate students are admitted by the Office of Undergraduate Admissions. These students are given academic and career counseling by the Director of the Center for Continuing Education. Nondegree students may register for most of the undergraduate courses open to degree students, but under no circumstances can places in courses be preempted for them. Nondegree students are subject to most of the regulations herein. See information concerning admission procedures on page 72 and financial information on page 77.

Residents *in the Duke community* who are beyond college age but who have interest in resuming or beginning an undergraduate education are invited to the Center for preliminary academic or career counseling. Occasionally, short non-credit courses for members of the Duke community are sponsored by the Center. For further information consult the Director, Center for Continuing Education.

Reserve Officers Training Corps

Through the Naval and Air Force Reserve Officers Training programs, the University is cooperating with the Department of Defense in providing well-educated officers for the regular and reserve forces of the nation.

The Naval Reserve Officers Training Corps. There are two basic programs through which students can qualify for Naval commissions upon graduation; one, the Regular Naval Reserve Officers Training Corps program, which provides a maximum of four years in the University largely at government expense, followed by a commission in the regular Navy or Marine Corps; the other, the Contract program, which leads to a commission in the Naval Reserve or the U. S. Marine Corps Reserve.

The Regular Student. Quotas are awarded on the basis of an annual nationwide test and selection procedure. Students selected are enlisted in the U.S. Naval Reserve, appointed Midshipmen, USNR, and receive four years tuition, fees, and textbooks at government expense. In addition they receive subsistence pay and summer active duty pay which amounts to approximately \$750 per year. The regular midshipman may take any major at Duke leading to a baccalaureate or higher degree although certain majors, e.g., law, premedicine, religion, music, and art, must be approved by the professor of naval science on an individual basis. The student participates in two summer training cruises aboard ship and receives aviation and amphibious indoctrination at naval shore stations for one summer.

Upon graduation he receives a commission as Ensign in the Regular Navy, or Second Lieutenant in the Regular Marine Corps, after which he serves with the Navy or Marine Corps, as required by the Secretary of the Navy in the same manner as his officer contemporaries who are graduates of the U.S. Naval Academy. The minimum period of active duty is four years for regular officers.

The Contract Student. The contract student is selected from those regularly enrolled freshmen in Duke University who desire to qualify for a commission in the Naval or Marine Corps Reserve while pursuing normal courses of study. Since he normally will be ordered to three years active duty immediately upon graduation and commissioning, the Navy does not recommend that a medical, dental, or theological student apply for this program. He has the status of a civilian who has entered into a mutual contract with the Navy and is not eligible for the benefits and pay received by regular midshipmen. He enlists in a component of the U.S. Naval Reserve and receives subsistence pay of \$50 a month during his last two academic years. In addition he receives active duty pay during the two required summer cruises, normally taken after his sophomore and junior years (only one cruise is required of the class of 1971 and earlier classes).

Both Regular and Contract Students. No distinction is made between the two in the NROTC Unit. Contract students may compete each year for the Regular Program. If selected, they will be appointed to Regular status with the attendant benefits and pay. Both regular and contract students are deferred from Selective Service by virtue of their commitment to serve on active duty after graduation; both are provided necessary uniforms, equipment, and naval science textbooks; both are furnished the same naval science instruction and uniforms, and both are required to wear uniforms on drill days and other special occasions prescribed by the professor of naval science. Upon completion of their undergraduate work, both may apply for continuing studies leading to a graduate degree in certain science and engineering fields. Selection for graduate work is competitive and the number

selected is based on the needs of the Navy. If they desire, both regular and contract students may elect the Marine Corps option at the beginning of their junior year, thus qualifying for a commission in the Marine Corps. Both may participate in a Navy sponsored Flight Instruction Program leading to qualification for a private pilot's license, if successfully completed.

Academic Requirements for a Commission. The academic program for an approved degree and a commission for regular and contract students in the Class of 1972 and later must include all Naval Science courses offered and the following:

For NROTC students majoring in engineering, physics, chemistry, mathematics, or education with teaching majors in mathematics or physical sciences, one year of calculus, one year of physics or chemistry, and Mathematics 51 (or equivalent) are to be completed by the end of the junior year. History 99, Management Sciences 125, and Political Science 121 are to be completed prior to graduation.

For NROTC students majoring in arts, humanities, business, political science, economics and non-physical science or non-mathematics teaching majors in education, one year of calculus (preferred), or one year of statistics and probability, one year of physics or chemistry (preferred), or one year of biological/earth sciences, and Mathematics 51 (or equivalent) are to be completed by the end of the junior year. History 99, Management Sciences 125, and Political Science 121 are to be completed prior to graduation. Marine option students in their junior and senior years will take two relevant courses, approved by the professor of naval science. These are taught by the civilian faculty.

The Air Force Reserve Officers Training Corps. This unit functions as a regular department of instruction known as the Department of Air Force Aerospace Studies. It selects, trains, and commissions college men who desire to serve in the U.S. Air Force.

For enrollment in the General Military Course (freshman and sophomore years) the student must be accepted by the institution as a regularly enrolled student; must successfully complete such general survey and screening tests as may be prescribed; and must sign a loyalty certificate with the U.S. Government. Students initially entering the University who have had previous preparatory or high school military training are normally accepted in the General Military Course at the same academic level as that in which they are accepted by the University. The student may elect to attend a six weeks Field Training Course conducted at selected air force bases instead of enrolling in the General Military Course. If he chooses this option he will report to the Field Training Unit during the summer between his sophomore and junior years. To be eligible for continuation, or initial enrollment, in the Professional Officer Course (junior and senior years), a person must:

1. be a citizen of the United States;
2. be selected for advanced training under Air Force procedures;
3. enlist in the United States Air Force Reserve;
4. contract, with the consent of his parent or guardian if he is a minor, to complete the program of advanced training;
5. agree in writing to accept a commission in the U.S. Air Force, and to serve in the Air Force for the prescribed period;
6. complete successfully:
 - a. the General Military Course; or
 - b. six weeks of summer Field Training; or
 - c. have had prior honorable service in the Armed Forces of the United States. Students who qualify for the Professional Officer Course by successfully completing the General Military Course must attend four

weeks of Field Training between their junior and senior years. Students must also agree to take orientation flights when offered; must be less than 26 years of age at the time of graduation; and must successfully complete such general survey and screening tests as may be prescribed and must be selected by the professor of aerospace studies and the appropriate authority of the University.

Beginning in the second semester of their freshman year, cadets are eligible to compete for AFROTC College Scholarships. This scholarship includes tuition, books, laboratory fees, and \$50.00 a month subsistence. The scholarship is awarded on a merit basis and considers academic achievement, leadership potential, and overall performance. The scholarship can become effective in the sophomore year.

All students in the Professional Officer Course receive \$50.00 per month subsistence and are deferred from Selective Service. All uniforms, books, and training items needed for participation in the AFROTC program are supplied by the corps after receiving a \$20.00 deposit. This deposit is refunded to the student whenever he terminates his corps status.

A thirty-five hour Flight Instruction Program using light aircraft is restricted to seniors who may, upon completion of the course, qualify for a Civilian Private Pilot's License. To participate in this program, fourth year cadets must be physically and intellectually qualified for the Air Force Flight Instruction Program.

Upon graduation and completion of the Professional Officer Course, selected students for flying or line assignment will be offered commissions as Second Lieutenants in the Air Force Reserve. Reserve Officers who desire lifetime careers in the Regular Air Force may apply for regular appointments after serving on active duty for one year. Cadets who maintain a high academic average are eligible for designation as Distinguished AFROTC Cadets and later Distinguished AFROTC Graduates.

Army and Navy Nurse Corps Student Program. Students in the Basic Nursing Programs may apply for appointments in the Army Student Nurse Program at the beginning of their junior year, or in the Navy Nurse Corps Candidate Program at the beginning of their senior year. The appointments carry generous financial allowance. A student who participates twelve months or less serves on active duty in the respective service for twenty-four months. If support for two years has been given, she serves thirty-six months.





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Student Life

Residential Facilities

It is the aim of the University to provide through its residence halls program not only comfortable lodging, but opportunities for informal learning and the enrichment of the total educational experience.

The Woman's College. Fourteen residence houses afford both single and double rooms, although there are few singles in some of them. Students from all four classes reside in most of the housing units. Two of the houses are limited to living-learning projects where upperclassmen are grouped together according to special interests. One of these residences houses a coeducational experimental college project for students who are engaged in independent study and/or related course work. One floor of the Graduate Center, which is located on the West Campus near the dormitories of the School of Nursing, houses approximately 120 Woman's College students. Three of these residences are alternate plan dormitories, housing both men and women on alternate floors or alternate wings. Four of the women's dormitories participate in a federation.

Trinity College and the School of Engineering. The Men's Residence Halls are divided into forty-one living groups. These groups are of three major types: all-freshman houses, independent cross-section houses, and fraternity sections. The seven all-freshman houses, fourteen of the independent cross-section houses, and nine of the fraternity houses are open to freshmen. Three of the cross-section houses are alternate plan dormitories where men and women reside in the same building on alternate wings or floors. Several of the fraternities and cross-section houses are members of the three federations, groups of contiguous dormitories where men and women live in separate units.

The all-freshman houses accommodate approximately two-thirds of the freshman class. Each of these houses elects its own officers and council and organizes social, intramural, and other types of programs. A housemaster—a graduate or professional school student—assisted by several upperclassmen who serve as assistant housemasters, guides the program of the house.

After the freshman year, all fraternity men residing on campus are required to live in fraternity sections. Men who do not affiliate with a social fraternity may choose from among the sixteen independent, cross-section houses. Each of these houses has its own officers and its own programs. These programs include discussions with faculty members, seminars, film festivals, as well as social and athletic events. Each house is staffed by a resident fellow, a graduate or professional school student, who lives in the house.

The School of Nursing. School of Nursing students presently live in Hanes House and Hanes Annex which have double and a few single rooms. Entering students may state the type of room preferred; however, since returning students have first choice of rooms, no guarantee is made concerning room assignments. After the initial assignment, students themselves make arrangements for room selection and roommates through the Office of the Dean of Student Affairs.

Resident house counselors, who are on the staff of the Dean of Student Affairs, live in the dormitories and are responsible, with the cooperation of the student government, for their administration.

Living Off-Campus. Students above the freshman level who wish to live off-campus should apply for such authorization from the Dean of Men, the Dean of Women, or the Dean of the Student Affairs of the School of Nursing, as appropriate. Once non-resident status is requested, there can be no guarantee of a space in the dormitories should the student decide to move back on campus, at any time during the remaining period of undergraduate study.

Students beyond the normal fourth year of the undergraduate program cannot be guaranteed space in the dormitories.

Food Services

The East Campus. All students residing on the East Campus and freshmen in the Graduate Center are required to contract for their meals in the University Dining Halls on a semester basis. They have the option of a seven-day, twenty-one meals a week plan for \$318.00 per semester, or a five-day (Mon.-Fri.) fifteen meals plan for \$270.00 per semester. There are no provisions for changing plans during a semester. On the East Campus there are two dining halls. Ordinarily the students who reside in Southgate and Gilbert-Addoms take their meals in Gilbert-Addoms, and those living in the other East Campus dormitories take their meals in the Woman's College Union. Students who reside in the Graduate Center and are on the board contract basis take their meals in the dining room in that building.

Provisions are also made for students who are on the board basis to take their meals in the Great Hall or the University Room on the West Campus.

The West Campus. The dining facilities on West Campus include two cafeterias with multiple-choice menus, the Oak Room which is a service dining hall where full meals and *a la carte* items are served, and a self-service snack bar, the Cambridge Inn, which is open throughout the day and evening. West Campus students may also take their meals in the Graduate Center Dining Halls by paying cash and in either of the dining halls on the East Campus where a discount may be arranged by buying a book of meal tickets.

The School of Nursing. Freshmen and sophomores in the School of Nursing are required to contract for their meals in the University Dining Halls on a semester basis. Their options are the same as those offered to students residing on the East Campus. The board privilege is available for upperclassmen, who are not



required to contract for their meals, by making arrangements through the Dining Halls Office, The Graduate Center.

Religious Life

"Eruditio et Religio," the motto emblazoned on the seal of the University, proclaims belief in the essential union of knowledge and religion in the educational process. The Duke Chapel stands at the center of the campus, an inspiring symbol of the place of religion in the full human life.

In the University Service of Worship on Sunday morning, two hundred students participate by singing in the choir; at least one hundred other students aid in special ways as ushers, collectors, and assistants in the communion services.

Opportunities are provided through the Chapel and its related activities to translate worship into effective Christian living. Denominational, interdenominational, and interfaith loyalties are emphasized. Some Protestant, Roman Catholic, and Jewish students are organized in their respective groups, each has a denominational chaplain or adviser, and activities are sponsored by a United Campus Ministry.

The University Christian Council, composed of students and a few faculty members, promotes the interdenominational religious life in its many facets. The work of the Council and of the denominational program is under the supervision of the Chaplain to the University, who is also Director of Religious Life. He, with an associate director of religious life and eight denominational chaplains, coordinates the religious program of the campus. They offer personal guidance and spiritual counsel to all students in matters related to their faith.

The Dean of the Chapel is a regular preacher to the University. He serves as an officiating minister in the Chapel, preaches each month, and participates in the planning of the University's religious program.

Additional opportunities for the enrichment of the student's religious life are offered in organ and carillon recitals, choral concerts, other special services held from time to time, and in the sermons of distinguished guest preachers from many lands who are heard in the Duke Chapel.

Services Available

University Health Service. One of the prerequisites for fully enjoying and gaining the most from the University experience is a sense of well-being. The aim of the University Health Service is to provide medical care and health advice to help the student enjoy his privilege of being a part of the University community. To serve this purpose, both the University Health Services Clinic and the University Infirmary are available for student health care needs.

The facilities of the University Health Services Clinic are available during both regular and summer sessions to all currently enrolled full-time undergraduate students as well as to regularly enrolled students in the graduate and professional schools.

The main components of the Health Service include the University Health Services Clinic located in the Marshall I. Pickens Rehabilitation Center and the University Infirmary on the East Campus. For treatment of most illnesses or injuries, students should first contact the University Health Clinic. The campus bus makes regular runs to the Rehabilitation Center; however, if required, emergency transportation can be obtained from either the Duke Campus Police or the Durham Ambulance Service. Residential staff personnel should be consulted whenever possible for assistance in obtaining emergency treatment. For a description of the specific services provided by the University Health Clinic and Infirmary, the *Bulletin of Information and Regulations* for the undergraduate colleges and schools should be consulted.

The University Counseling Center. The University Counseling Center provides a counseling service designed to assist individuals in gaining a better understanding of themselves and of the opportunities available to them and to aid them in developing more effective problem-solving skills. The professional counselors do not attempt to impose solutions on the individual. They provide information the individual needs to make judicious decisions and help him work out his own problems in ways that will be satisfying to him. The following are some of the areas in which the counseling services offered by the center have been found to be helpful: choosing a career, planning educational programs leading to careers, identifying and overcoming educational deficiencies, developing greater self-understanding, and developing more effective social relationships.

The Counseling Center has available a wide variety of tests which may be employed in the counseling process. These tests provide measures, among others, of general ability, scholastic aptitude, special skills, achievement interests, and levels

of adjustment. In the process of counseling, the counselee may, with the help of the counselor, choose those tests that may provide information he needs to make decisions.

Counseling undertaken in the University Counseling Center is confidential between the counselor and counselee. The center releases counseling reports only to those persons specifically designated in writing by the counselee.

Office of Placement Services. The Office of Placement Services is the liaison between the University community and potential employers in business, education, and government. Its concern is to help all Duke students obtain employment consistent with their qualifications, interests, and desires. The office arranges initial interviews with representatives from business and industry, schools and colleges, government agencies, and graduate schools, and maintains a complete file of job openings.

Seniors interested in the Office of Placement Services should register early in the year. Personal interviews with members of the staff are available to seniors after they have registered.

Information about summer employment is available to all students. An extensive list of summer openings is maintained, and occasionally interviews for these jobs are arranged on campus..

Student Activities

Associated Students of Duke University. The Associated Students of Duke University (ASDU), composed of the entire undergraduate student body, is responsible for the articulation of student thought and opinion on University-wide matters and for shaping of student opinion toward constructive changes in the educational process and University environment.



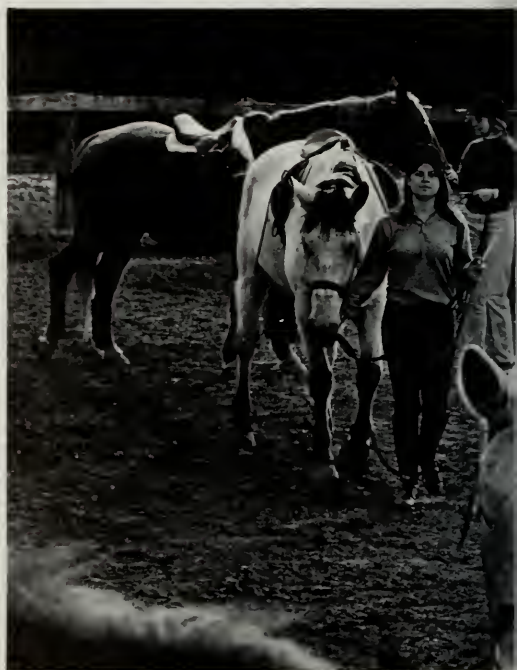
The ASDU legislature is composed of representatives of each of the undergraduate living groups on campus. It acts in three ways: first, it fulfills the role of student government, chartering student organizations, regulating certain rules regarding conduct and student elections, and so forth. Second, it attempts, as a student voice, to discern problems of primary concern to the student body and to take positive action in those areas. Third, it tries to identify the more subtle aspects of decision-making which underlie these problems and focuses student attention on these issues.

The executive cabinet is the coordinating body of all ASDU functions. It consists of the president, four vice-presidents (one from each college or school), secretary, and treasurer.

Various executive committees of ASDU undertake projects for the direct benefit of the student body, such as those concerned with residential life, academic affairs, admissions, and so on. A budget commission allocates all student fees and university subsidies to the various student organizations.

Judicial System. Students in the Woman's College, Trinity College, the School of Engineering, and the School of Nursing constitute an undergraduate community whose members are subject to the Undergraduate Community Code. Violations of the code and certain University regulations are adjudicated before the Undergraduate Judicial Board, composed of representatives of the student body, the faculty, and the administration. The constitution of the Board, the Judicial Code of the Undergraduate Community, and the procedural safeguards and rights of appeal guaranteed to students are published in the *Bulletin of Information and Regulations* for the undergraduate colleges and schools.

As provided under the judicial structure of the University, each residential unit has a Judicial Board which has jurisdiction over all offenses involving violations of regulations relating to dormitory procedures and social regulations not covered by the Undergraduate Community Code or the University policies and regulations.



Social Regulations—Woman's College. The individual student is responsible for decisions and choices within the framework of the regulations of the community. The College does not assume *in loco parentis* relationships.

The regulations of The Woman's College are based upon two concepts: The necessity for the community to establish rules governing the way in which a student lives with her fellows, and the principle of the individual's commitment to live under and uphold the system. Some regulations are considered necessary for the protection of the rights and privileges of members of the community. Most of these regulations are enforced by the community itself. The College reserves the right, however, to request the withdrawal of any student who does not uphold its standards of scholarship and conduct, or who by her behavior, in the judgment of appropriate judicial tribunals or University authorities, brings the University or its Woman's College into disrepute.

The regulations of The Woman's College are administered by the Judicial Council in cooperation with the administrative staff of the College. Any student, or group of students, may recommend a change in the regulations by presenting a petition to the Campus Community Council or by making such recommendations to their House Judicial Representative.

For a description of The Woman's College residential judicial structure, procedures and sanctions, and dormitory regulations, the *Bulletin of Information and Regulations* for the undergraduate colleges and schools should be consulted.

Social Regulations—Trinity College and the School of Engineering. During the academic year 1968-69, the West Campus Community Council adopted a set of "Guidelines for Social Legislation on West Campus," under which each living group was to establish and enforce its own social regulations. The "Guidelines" specify that regulations of each living group must be formulated and enforced in recognition of "the basic necessities of students, such as provisions for sufficient quiet and privacy for study and sleep during some reasonable part of the night and morning, as well as sufficient time and privacy for bathing and dressing." The whole of the "Guidelines" is based upon the premise that "living groups and individuals they comprise will act responsibly when given authority over their own affairs."

Social regulations for men's living groups must be approved by the Campus Community Council.

Social Regulations—School of Nursing. The Nursing Student Government Association Judicial Board has the major role in supervising phases of community living which directly concern the welfare of the student body.

The major concern is with the responsibility that each individual undertakes as a member of the community. The majority of standards of good taste are entrusted to each individual's sense of social responsibility; the preference is to suggest, rather than to dictate, basic standards of community living that contribute to a pleasant, attractive environment in which all students can develop to best advantage. Although it is understood that each Duke student is an individual with a unique social background, it is important that one retains an acute sensitivity to the good of the college society as a whole and to the sense of professional nursing which is developing throughout the college years.

The dormitory is the principal area wherein thoughtfulness and consideration are of prime importance in fostering a pleasant atmosphere. In the use of public areas, particularly, the individual must remember that these facilities serve all the residents of the dormitory. Individual conduct should neither embarrass fellow residents nor infringe upon their rights and feelings.

The regulations of NSGA are administered by the Judicial Board in cooperation with the administrative staff. It is the responsibility and privilege of all students to participate in the formulation and modification of the regulations by which they live by offering suggestions, ideas, and criticism to either NSGA or the Campus Community Council.

For current regulations adopted by the NSGA, the *Bulletin of Information and Regulations* for the undergraduate colleges and schools should be consulted.

Office of Student Activities. The Office of Student Activities has as its responsibility the coordination and advising of those activities, undergraduate and graduate, that transcend the individual colleges and schools with a major emphasis on the development of the full range of these activities as they relate to the educational function of the University. In addition, this office is responsible for giving financial advice and coordination in cooperation with the Controller's office.

Social and Cultural Organizations

Although the campuses for men and women are geographically separated, extracurricular life is in many respects coeducational. The scope of the more than one hundred student organizations is suggested by a partial listing of the following activities: Association of African Students, Alpha Phi Omega service fraternity, Bridge Club, Chess Club, Campus Crusade for Christ, Cheerleaders, International Club, Karate Club, Outing Club, Sailing Club, Students for a Democratic Society, Women's Liberation, Young Americans for Freedom, and the YM-YWCA.

Many opportunities are provided on campus in the area of music and drama. The Duke Chorale, the Chapel Choir and Chancel Singers, Marching Band, Pep Band, Symphony Orchestra, and the Madrigal Singers are examples of musical activities. Duke Players performs established and experimental drama; Hoof 'n' Horn presents musical comedy.

Most academic departments sponsor organizations and programs for students with special academic or professional interests. There are also academic and leadership honorary societies.

In the area of government, in addition to the Associated Students of Duke University, are the Engineers' Student Government, the Nurses' Student Government Association, the Pan-Hellenic and Interfraternity Councils, the Independent Houses Association, and the Association of Women's Residences.

Approximately half of the undergraduate students belong to fraternities and sororities. Although there are no chapter houses, the program of fraternity and sorority activity is carried on within the sections of the regular dormitories or buildings set aside for this purpose. Seventeen national and two local social fraternities, and nine national sororities, have chapters on campus. Social functions are frequent enough to afford the relaxation needed from work required in the classroom and laboratory.

The Union Building, located on the West Campus, is the student center for coeducational activities. It houses, among other groups, the University Union organization. This body is unique in its coeducational aspects, bringing men and women together in carrying out its stated purpose—to stimulate, promote, and develop the social, recreational, cultural, educational, and spiritual activities of the Duke University community. The Union sponsors a broad program including lectures, concerts, recreational activities, dances, and exhibits adapted to the leisure time interests and needs of individuals and diverse groups within the University and Durham communities.



In one section of the West Campus Union are housed dining facilities, University store, grill, soda fountain, post office, barber shop, bank, and ballroom. Elsewhere in the building are student organization offices, meeting rooms, an information center, music and reading lounge, and recreational areas. Many additional service and activity areas are provided on The Woman's College campus.

The Office of Cultural Affairs, located in the Union Building, is responsible for the coordination of many of the cultural and entertainment events which take place on the campus. In addition, the Duke University weekly calendar of events and semester calendar of events are published and distributed from this office.

Publications

The Duke *Chronicle*, the campus newspaper, is published five times weekly, and the student-operated FM and carrier current radio station, WDBS, produces daily programs. Three magazines and a comprehensive yearbook are published by and for all students. These publications are under the direction of a Publications Board empowered to choose the editors and business managers and to review and approve the financial statements of all franchised publications.

The *DukEngineer* is the official student-published magazine of the School of Engineering. It appears twice each semester and contains articles on technical and semi-technical topics and other matters of interest to the School.

Recreational Activities and Intramurals

The Duke Intramural Program provides all students an opportunity to participate in some form of competitive athletics. The program consists of sixteen different activities which include bowling, cross country, golf, handball, horseshoes, tennis, football, badminton, basketball, swimming, table tennis, volleyball, wrestling, softball, tennis, and track.

In a typical year more than 3,000 students compete for the many intramural titles and trophies that are awarded. Duke's intramural program is considered one of the finest overall and well-rounded programs in the country. Each year Duke, North Carolina, N. C. State, and Wake Forest meet in the annual Big Four Intramural Day.

Within the Women's Recreation Association, various clubs including modern dance, water ballet, and other sports groups offer the student opportunities to take part in various extracurricular activities.

Students may use all the university's athletic facilities, when not in use for a scheduled events. Students may also check out various athletic equipment. Facilities for recreation include the golf course, tennis courts, swimming pool, intramural building, gym floor, bowling lanes, and numerous playing fields. A variety of clubs dealing with gymnastics, scuba diving, sailing, cycling, karate, rugby, and other activities are available to interested students.

Intercollegiate Athletics Program

The intercollegiate athletic program at Duke University offers interested students an opportunity to participate in twelve varsity sports. They are football, cross country, soccer, basketball, swimming, fencing, wrestling, track, baseball, golf, tennis, and lacrosse. Freshmen are eligible to participate on all varsity teams with the exception of football and basketball. The University has freshman programs in both of these sports.

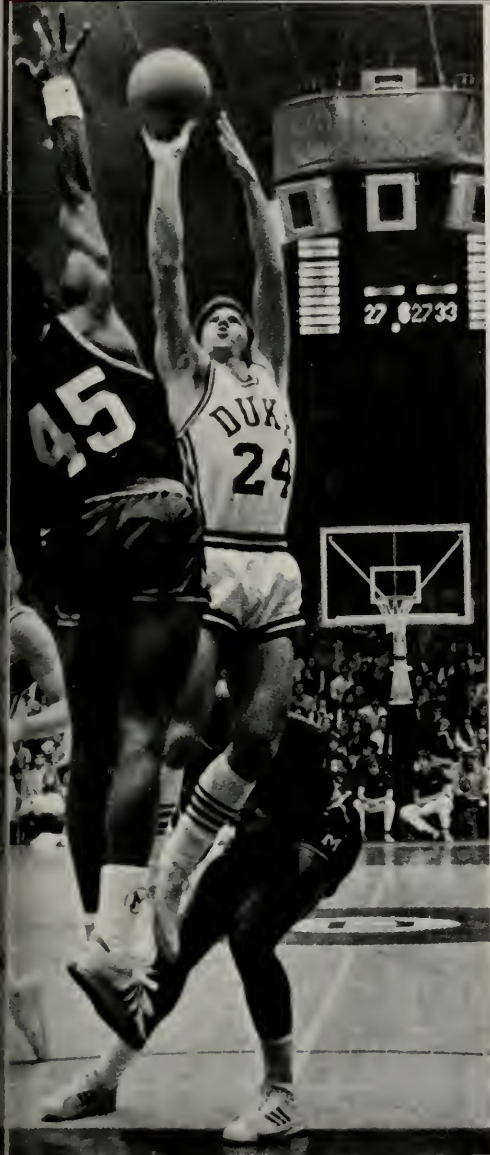
Duke is a member of the National Collegiate Athletic Association and the Atlantic Coast Conference (ACC). The Atlantic Coast Conference consists of Clemson, Duke, Maryland, North Carolina, North Carolina State, Virginia, and Wake Forest.

The Director of Athletics provides departmental leadership and coordinates all athletic policies with the University Athletic Council. The Council consists of representatives from the undergraduate student body, the faculty, the administrative staff, and the alumni. They meet with the Director of Athletics periodically during the school year to discuss the athletic programs and make recommendations concerning athletic policies. The Chairman of the Council is appointed by the President of the University and he is the official University representative at national and conference athletic meetings.

Prizes and Awards

The achievements of undergraduate students are recognized in various fields of college activity. The following prizes suggest the range of the recognition:

The Debate Council. This council authorizes the awarding of medals to members of the graduating class who have represented the University in at least two intercollegiate debates. The medals are given by the local chapter of the Tau Kappa Alpha Fraternity.



The Robert E. Lee Prize. This prize is the gift of the late Reverend A. W. Plyler, of the Class of 1892, and Mrs. Plyler. The sum of \$50 is awarded annually at Commencement, preferably to that member of the senior class of Trinity College or the School of Engineering who, in character and conduct, scholarship, athletic achievement, manly virtues, and a capacity for leadership, has most nearly realized the standards of the ideal student.

Medal of the North Carolina Association of Certified Public Accountants. The North Carolina Association of Certified Public Accountants annually awards a medal to the senior who, in the judgment of his instructors, is the most outstanding student in accounting in his graduating class.

Julia Dale Prize in Mathematics. This is an annual cash prize of at least \$50. The winner is selected by the Department of Mathematics on the basis of excellence in mathematics. In some years first and second prizes are given.

The Henry Schuman Music Prize. This prize of \$100 is awarded annually to an undergraduate of Duke University for an original composition of chamber music or a distinguished paper in music history or analysis. The award is sponsored by The Woman's College and the Department of Music of Duke University through a continuing gift from Dr. and Mrs. James H. Semans who named the prize after Mr. Henry Schuman, a life-long friend of the Semans and Trent families, a talented amateur violinist, and one who helped to build valued collections in the Duke Library.

The Phi Lambda Upsilon Prize. Phi Lambda Upsilon, honorary chemical society, yearly awards a suitable prize to an outstanding junior who is majoring in chemistry. The recipient's name is inscribed on a plaque displayed in the Chemistry Library.

The Chemistry Department Award. This prize is awarded in the spring of each year for scholarship in chemistry, physics, and mathematics. The prize consists of a one-year junior membership in the American Chemical Society and a one-year subscription to either the *Journal of the American Chemical Society* or *Industrial and Engineering Chemistry*. To qualify for this prize, the student must (1) be enrolled as an undergraduate of Duke University and (2) be taking or have taken a fourth-year chemistry course. The selection is based on the grade average for all courses taken in chemistry, physics, and mathematics. In case of a tie equal awards are given.

The James B. Rast Memorial Award in Comparative Anatomy. This award is given annually by the parents of James Brailsford Rast in memory of their son, a member of the class of 1958 at Duke University. The award, consisting of the *Atlas of Descriptive Human Anatomy* by Sobotta and bearing the James B. Rast Memorial bookplate, is given to the student who demonstrates the greatest achievement in the study of comparative anatomy.

The Winfred Quinton Holton Prize in Primary Education. This prize was established in 1922 by gifts of Holland Holton, '07, and Mrs. Lela Young Holton, '07, in memory of their son, Winfred Quinton Holton, with the income to be used to provide a prize for investigative work in primary education. This prize of approximately \$175 may be made annually. Competition is open to Duke seniors and graduate students who are candidates for a degree in elementary education. A student who wishes to be considered for the prize must submit a paper to be judged by a faculty committee in the Department of Education. The student must first



secure a faculty supervisor and only scholarly papers which the student and faculty supervisor deem appropriate for publication should be submitted. Papers must be submitted by April 1 for consideration in a particular year.

The Anne Flexner Memorial Award in Creative Writing. This award has been established by the family and friends of Anne Flexner, who graduated from Duke in 1945. It consists of \$50.00 in cash and a number of books chosen by the student. The award is given annually for the best piece of creative writing submitted by a Duke undergraduate. The competition is limited to short stories (5,000 word limit), one-act plays (5,000 word limit), poems (100 line limit), and informal essays (3,000 word limit). Only one manuscript may be submitted by a candidate, and it must be delivered to the English Office, Room 325 Allen Building, before April 1.

The William Senhauser Prize. This prize is given by the mother of William Senhauser in memory of her son, a member of the Class of 1942, who lost his life in the Pacific Theatre of War on August 4, 1944. The award is made annually to the sophomore or junior in Trinity College or the School of Engineering who has made the greatest contribution through participation and leadership in intramural sports. The winner of this prize is chosen by a committee selected by the President of the University.

The Friends of Duke University Library Prizes. This group offers three prizes in an annual contest open to all undergraduate students for the best book collections acquired during their college year. The contest is supervised by the Undergraduate Committee of the Friends of the Library, which announces each fall the terms of the award. Inquiries may be directed to the Curator of Rare Books. Collections entered in the contest are exhibited each spring in the Perkins Library. The prizes are awarded on the basis of the student's collection, a personal interview to determine the overall planning and objectives of his collecting activity, and his familiarity with his own books and the general field of his collecting interest.

The William T. Laprade Prize in History. This prize is offered in honor of William T. Laprade, who was a member of the History Department at Trinity College and Duke University from 1909 to 1953, and Chairman of the Department from 1938 to 1952. It is awarded to that senior who is graduating with distinction and whose senior essay in history has been judged unusually meritorious.

The Edward C. Horn Memorial Prize for Excellence in Zoology. This prize is given each year to the graduating zoology major who, in the opinion of the zoology faculty, shows the highest level of academic achievement and promise. It is offered in memory of Professor Edward C. Horn as a tribute to his warm regard for students and faculty and his appreciation of scholarly excellence. The prize consists of books appropriate to the student's field of interest.

The Donald E. Spofford Medal. This medal is presented to the most outstanding male member of the student government association.

The Horace F. Inman Award. This award is made to the fraternity, freshman, and independent dormitory which throughout the year demonstrates the best qualities in citizenship.

The James A. Oliver Memorial Award. This award was established in 1963 by the family of James A. Oliver with the cooperation of Delta Mu Tau, Duke student music honorary fraternity, and is given to the student or students who have done the most to further the interest of music at Duke University. A prize of up to \$350.00 is awarded annually.

The Tau Beta Pi Prize. This prize is awarded each year by North Carolina Gamma Chapter of Tau Beta Pi, engineering national honor society, to a sophomore student in engineering for outstanding scholastic achievement during the freshman year.

The Walter J. Seeley Scholastic Award. This award is presented annually by the Engineers' Student Government to that member of the graduating class of the School who has achieved the highest scholastic average in all subjects, and who has shown diligence in pursuit of an engineering education. The award was initiated to honor the spirit of academic excellence and professional diligence demonstrated by Dean Emeritus Walter J. Seeley. It is hoped that this award will serve as a symbol of the man and the ideals for which he stands. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

The American Society of Civil Engineers Prize. This prize is awarded annually by the North Carolina Chapter of the American Society of Civil Engineers to two outstanding seniors in civil engineering, upon recommendation of the faculty of the Civil Engineering Department. The basis for selection is the student's scholastic record, his contribution to the student chapter, and his participation in other college activities and organizations. The prize consists of a Certificate of Award and the payment of one year's dues in the American Society of Civil Engineers.

The American Public Works Association Prize. This prize is awarded annually by the North Carolina section to an outstanding senior in civil engineering upon the recommendation of the faculty of the Civil Engineering Department. The basis for selection is the student's scholastic record and his interest in a career in public works. The prize consists of a Certificate of Award, one year's payment of dues in the American Public Works Association, and a \$25 cash award.

The George Sherrerd III Memorial Award in Electrical Engineering. This award is presented annually to that senior student in electrical engineering who, in the opinion of the electrical engineering faculty, has attained the highest level of scholastic achievement in all subjects and simultaneously has rendered significant service to the School of Engineering and the University at large. The award was established in 1958 by the parents of George Sherrerd, III, a graduate of the Class of 1955, to recognize outstanding undergraduate scholarship. The recipient receives a monetary award and his name is inscribed on a plaque displayed in the Engineering Building.

The Charles Ernest Seager Memorial Award. This award recognizes outstanding achievement in the annual Student Prize Paper Contest of the Duke branch of the Institute of Electrical and Electronics Engineers. The award, established in 1958 by the widow and friends of Charles Ernest Seager, a graduate of the Class of 1955, consists of inscribing the name of the contest winner on a plaque displayed in the Engineering Building.

The Milmw Prize. This prize is awarded annually to the student from North or South Carolina graduating in the Department of Electrical Engineering who, in the opinion of the faculty of that department and, as shown by his grades, has made the most progress in electrical engineering during his last year in School. The prize consists of a Certificate of Award and one year's payment of dues in the Institute of Electrical and Electronics Engineers for the membership year in which the honoree is awarded his baccalaureate degree.

The American Society of Mechanical Engineers Award. This award is presented annually to a senior in mechanical engineering for his outstanding efforts and accomplishments in behalf of the American Society of Mechanical Engineers Student Section at Duke. The award consists of a Certificate of Recognition.

The T. C. Heyward Award. This award is given annually to the outstanding sophomore in mechanical engineering by Pi Tau Sigma. The award will normally consist of a handbook as well as a small cash award.

The Machinery Magazine Award. This award is presented annually by The Industrial Press, publisher of the magazine, to the outstanding student in machine design in the graduating class of the School of Engineering. The award consists of a copy of the latest edition of *Machinery's Handbook*.

Duke University School of Nursing Alumnae Award. The Duke University School of Nursing Alumnae Award is presented to the student in the graduating class who has demonstrated outstanding leadership, scholarship, and nursing skill.

The Moseley Award. The Moseley Award of \$25.00 is given to the student in the senior class who has shown the most skill in the art of nursing throughout her program in the School of Nursing.



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Admission

Principles of Selection

James B. Duke, in establishing his Indenture of Trust, requested that “great care and discrimination be exercised in admitting as students only those whose previous record shows a character, determination, and application evincing a whole-some and real ambition for life.” In this light and in view of the institution’s limited enrollment, Duke University looks beyond the basic characteristics of academic competence possessed by the majority of applicants. It seeks in each prospective student, regardless of race, color, religion, or national origin, evidence not only of intellectual promise and maturity of judgment, but also a degree of positive energy. Often, this energy is expressed in the form of special talents and accomplishments, but it is consistently seen in a student’s determination to make creative use of the opportunities and challenges posed by Duke University.

Requirements for Application

There are no inflexible subject matter requirements. At least 15 units of acceptable secondary school credit must be presented, however, and of these at least 12 must be in college preparatory subjects: English, foreign language, history and social studies, mathematics, and physical or biological sciences. Applicants for the School of Engineering are advised to present 4 units of mathematics and at least 1 unit in physics or chemistry.

The Scholastic Aptitude Test given by the College Entrance Examination Board and three Achievement Tests (one of which must be in English composition) are required of all candidates for admission. (Since placement in language study can be determined by an achievement test score, it is recommended that a candidate who has had two or more years of a foreign language in secondary school take the CEEB Achievement Test in that language.) Candidates for the School of Engineering are required to take an Achievement Test in mathematics.

Application Procedures

Candidates for admission must apply no later than February 1 of their senior year, and normally do so during the preceding fall. Decisions are mailed from the University by April 15.

Application forms and instructions may be obtained from the Office of Undergraduate Admissions, Duke University, Durham, North Carolina 27706. A non-refundable processing fee of \$20.00 must accompany the completed application form.

An interview at Duke is encouraged if a visit to the campus is feasible, for it is expected that the student and the institution will benefit from the clearer impression each may gain of the intangible qualities of the other. A candidate who wishes an interview may write to the Director of Undergraduate Admissions for an appointment.

Midyear Admission. Midyear admission allows a limited number of freshmen to begin their college work a semester early or to postpone matriculation for experience in employment, travel, or independent study. The application deadline for new candidates is October 1; midyear applicants are expected to complete all the requirements set forth for fall admission. Students will be notified of the decision on their applications by November 15 with the expectation that those who are accepted will reply by December 1.

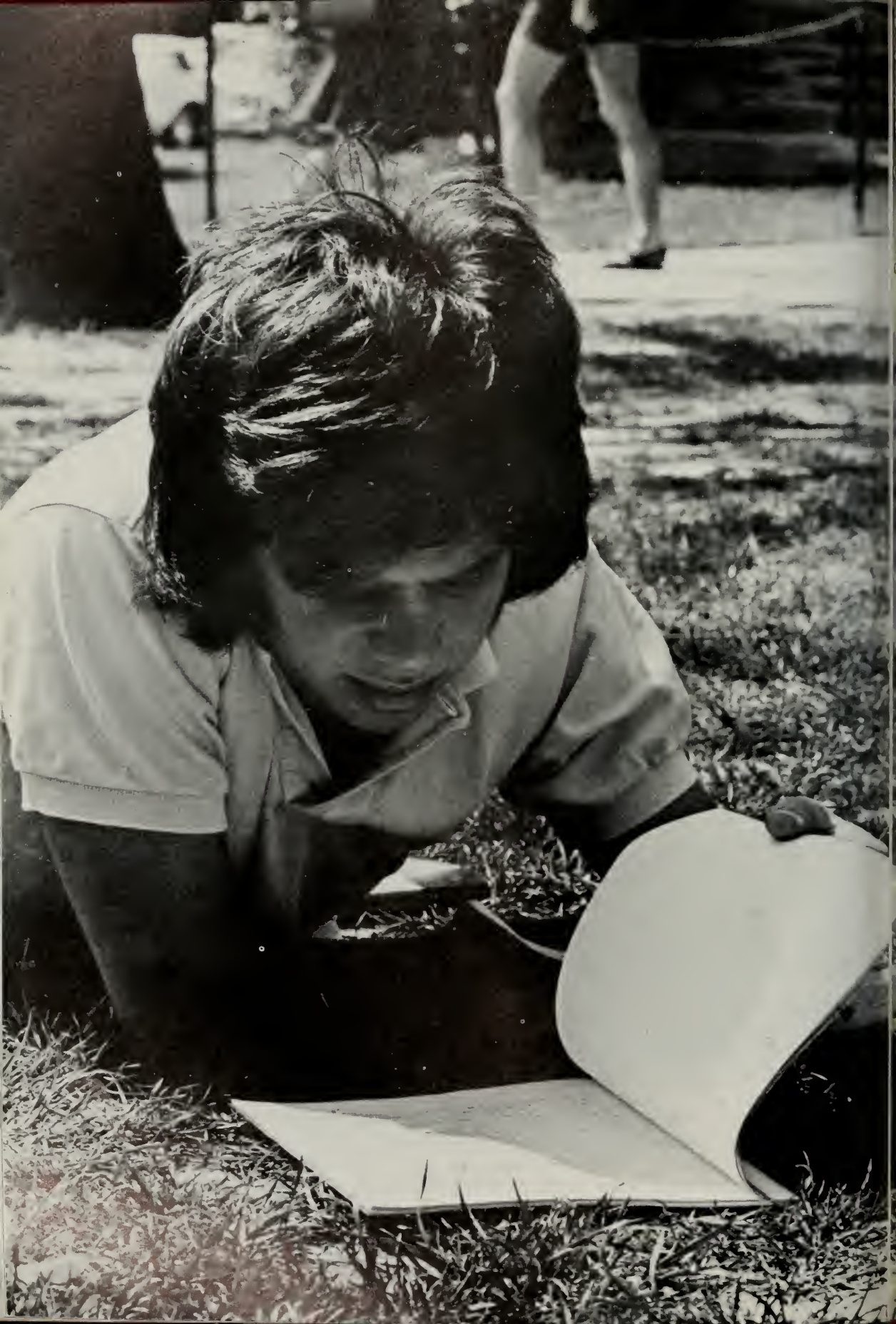
Early Notification. Early notification exists for the student who wishes to learn of the decision on his application by February 15. The application deadline for early notification is January 1 of the senior year, thus enabling the candidate to submit for review both his record for the first semester of the senior year and the scores on the SAT and Achievement Tests taken through December. Applicants for early notification are free to apply concurrently to other colleges. Those who are accepted by early notification must reserve a place in the class by March 1 and pay the registration and room deposit fees. The student considering the advantages of early notification would be wise to keep the March 1 reply obligation clearly in mind as he investigates the application deadlines of other colleges.

Admission by Transfer. Admission by transfer from other institutions may be arranged for a number of students who present for review transcripts of a full year of academic work completed at fully accredited colleges. Transfer students are required to spend at least two years in residence at Duke. All candidates must submit, in addition to the normal application materials, official transcripts of all work completed at other accredited colleges, employment records when candidates have been employed for an extended period since graduation from secondary school, and scores on the Scholastic Aptitude Test of the College Entrance Examination Board. A course in which a grade of less than C- has been earned cannot be accepted for transfer credit.

Nondegree Students. A small number of nondegree students may be admitted for enrollment in such courses of instruction as their earlier training and experience may qualify them to take. A candidate for admission to nondegree status applies directly to the Office of Undergraduate Admissions. The application should be filed a month in advance of registration. A \$20.00 fee is charged. Students who are admitted to nondegree status may not apply for acceptance as candidates for a degree until eight courses are successfully completed and all the normal requirements for admission are met. For further information, see the section on the Center for Continuing Education.



Readmission of Former Students. A student who desires to return, following withdrawal from college, should apply to the dean of his college. The student will be asked to send a detailed statement of his activities since withdrawal, a transcript of academic work taken, and recommendations.



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Financial Information

Tuition and Fees

The prospective student who seeks the optimum opportunity in higher education will not be a bargain hunter. Certainly, some sound plan for paying the cost of college must be devised, but this plan should be formulated after the thoughtful selection of an institution has been made. No college or university can honestly say that an education at the college level is inexpensive. Most university people and the ever-growing college alumni families across the country, however, will express the belief that the benefits derived from a college education constitute a handsome return on the dollars invested.

Each prospective student should analyze carefully his financial situation. In making such analysis it should be recognized that the primary responsibility for defraying the cost of an education lies with the student and his family. The typical college student can depend upon some contribution from his family's current income, a proportionate share of family savings, and anticipated income from summer employment. The number of years of study contemplated and the number of dependent children in the family should be considered in computing the funds which will be available in a particular year.

Fees paid by the students cover only a part of the cost of their instruction and the operations of the University. Income from endowment and contributions from the alumni and other public-spirited men and women meet the balance, which constitutes more than half the total cost.

Estimated Expenses for an Academic Year. Certain basic expenditures are to be considered in preparing a student's budget such as tuition, room, and board. These necessary expenditures together with a reasonable amount allotted for miscellaneous items such as books and supplies are shown below:

	<i>Men</i>	<i>Women</i>
Tuition	\$2,450.00	\$2,450.00
Room Rent (Double Room)	404.00-502.00	430.00-502.00
Board—Seven-Day Plan	750.00*	636.00†
Five-Day Plan	—	540.00†
Books and Supplies	175.00	175.00

*Cafeteria estimate.

†Board rate.

It should be realized that additional expenses will be incurred which will depend to a large extent upon the tastes and habits of the individual. It is realistic to suggest that the average Duke student, however, can plan on a budget of \$4,300.00 for the academic year. Travel costs, clothing purchases, and other major expenditures would have to be added to this estimate.

Debts. No records are released and no student is considered by the faculty as a candidate for graduation until he has settled with the Bursar for all indebtedness.

Bills may be sent to parents or guardians provided the Bursar has been requested in writing to do so. Failure to pay bills on or before the due dates will debar the student from class attendance until the account is settled in full.

Tuition. The tuition charge of \$1,225.00 per semester (\$2,450.00 for the academic year) is due and payable not later than the day of registration for a particular semester. After the day of registration refund of the tuition, on a pro rata basis, will be made only in the event the student involuntarily withdraws to enter the armed services or dies during the course of the semester.

Registration Fees and Deposit. New students, on notification of acceptance, are required to pay a nonrefundable first registration fee of \$20.00 and to make a deposit of \$100.00. The deposit will not be refunded to accepted applicants who fail to matriculate. For those who do matriculate, \$50.00 of the deposit serves as a continuing room deposit for successive semesters, and the remaining \$50.00 serves as a continuing registration deposit. Arrangements for refund of the \$50.00 room deposit are described in information furnished each resident student by the Housing Bureau.

Readmission. Students who have been readmitted to the University after an absence of one or more semesters, on notification of readmission, are required to make the \$100.00 room and registration deposit.

Late Registration. Students who register in either semester at a date later than that prescribed in the Calendar of the colleges must pay to the Bursar a fee of \$10.00.

Refunds. The \$50.00 preregistration deposit will be refunded to students (1) whom the University does not permit to return, (2) who graduate, or (3) who request the refund at the time of preregistration, thus indicating their intention not to return for the following semester. The preregistration deposit will not be refunded to students who preregister and fail to enter the following semester on schedule.

ROTC Deposit. An Air Force ROTC deposit of \$20.00 is required of students enrolling in air science to cover possible loss of military equipment issued to them. This deposit is refunded to the student upon return of issued equipment.

School of Nursing.* A special health fee of \$25.00 is charged for all nursing students. (See Student Health Service, page 58.) Junior nursing students desiring use of Duke Hospital Laundry facilities will be charged a fee of \$20.00 for each semester.

Part-time Students. In the regular academic year students who register for no more than two courses in a semester are classified as part-time students. Part-time students will be charged at the following rates: One course, \$250.00; half-

*Additional medical fees may be required for certain nursing electives.

course, \$125.00; quarter-course, \$62.50; one course plus laboratory or precept, \$335.00. Registration for more than two courses requires payment of full tuition. Graduate students registered for undergraduate courses will be assessed 3 units for non-laboratory courses and 4 units for laboratory courses.

Auditors. Auditing of one or more courses without charge is allowed students paying full fees, provided that the consent of the instructor is obtained. Students who are enrolled for one or two courses may audit other courses by payment of \$40.00 for each course audited. With the consent of the appropriate instructor and the Registrar, graduates of Duke may audit undergraduate courses for \$40.00 for each course.

Duke Employees. Certain full-time employees with two or more years of service with the University may request permission to take for credit or audit up to two courses during any one semester. Permission may be granted based on the individual merits and circumstances of each application. Employees receiving permission to take such courses for credit will be charged one-half of the tuition rate for special students as shown above. Courses may be audited upon payment of \$40.00 per course.

Duke Faculty and Spouses. See the *Faculty Handbook* or the *Center for Continuing Education* for certain financial benefits that accrue for faculty members and spouses.

Fees for Transcripts. Requests for transcripts should be directed to the Office of the Registrar. Ten days should be allowed for processing. A minimum fee of \$1.00, payable in advance, is charged for a single copy. A charge of fifty cents will be made for each additional copy on the same order.

Fees for Course Changes. Changes in courses for reasons not arising within the University require a payment of \$1.00 for each change made. No course may be elected later than two weeks after registration without the instructor's approval, and no student may be admitted to any class without an official enrollment.

Living Expenses

Housing. In the residence houses for undergraduate men, the rental charge for a single room ranges from \$540.00 to \$616.00 for the academic year; for a double room the charge ranges from \$404.00 to \$460.00 for each occupant per semester. Rental rates in the air-conditioned dormitories range from \$638.00 to \$666.00 for a single room for the academic year; for a double room the charge ranges from \$478.00 to \$502.00 for each occupant per year. Information concerning the student's obligations under the housing contract is published in the *Bulletin of Information and Regulations* for the undergraduate colleges and schools.

The residential units of the School of Nursing are Hanes House and Hanes Annex. In Hanes House the rental charge for a single room is \$600.00 for the academic year. The rental charge for a double room is \$450.00 for each occupant per year. In Hanes Annex, the rental charge for a single room is \$450.00 for the academic year. The rental charge for a double room is \$340.00 for each occupant per year.

Detailed information concerning the students' obligations under the housing contract and the consequences of failure to comply are published in the *Bulletin of Information and Regulations* for the undergraduate colleges and schools.

Food Services. The dining facilities on the West Campus include two cafe-

terias, with multiple-choice menus, and the Oak Room where full meals and a *la carte* items are served. The cost for the academic year will approximate \$750.00 but will vary from this amount depending upon the taste of the individual.

The dining halls in which all resident women have their meals are located in The Woman's College Union, in Gilbert-Addoms residence hall, and in the Graduate Center. The charge for board is \$318.00 per semester on the Seven-Day Plan or \$270.00 per semester on the Five-day Plan, payable at the time of registration. If a student withdraws during the first six weeks of the semester, a board refund is made on a pro rata basis; if withdrawal occurs after that time, no refund is allowed. Nursing students enrolled in clinical nursing courses (third and fourth years) are exempt from the board requirement.

Student Aid

It is the aim of the Financial Aid Program to provide, insofar as possible, financial assistance required by students who are unable to defray the complete cost of college from their own resources. This assistance is made available in the form of scholarships, grants-in-aid, remission of tuition, loans, and part-time employment.

During the current year more than 1,450 undergraduates have received scholarships, grants-in-aid, and remission of tuition in excess of \$2,100,00 and student loans in excess of \$450,000. In addition, undergraduates earn more than \$650,000 per year through part-time employment on the campus and in the city of Durham and surrounding area.

Freshmen received a substantial share of this aid: 570 freshmen received more than \$750,000 in scholarships, grants-in-aid, and remission of tuition, and over \$100,000 in loans.

Financial Aid for Entering Freshmen. Request for application materials for scholarships and other forms of financial assistance should be addressed to the Office of Undergraduate Admissions, Duke University, Durham, North Carolina 27706.

Scholarship candidates should initiate their applications for financial aid concurrently with their application for admission during the fall semester of their senior year in secondary school. Instructions concerning the specific requirements and deadline dates will accompany the application materials.

Scholarship candidates who desire to be considered for the maximum aid or maximum value of scholarships on the basis of financial need are required to submit the Parents' Confidential Statement of the College Scholarship Service, forms for which may be obtained from any high school guidance office or from the Office of Undergraduate Financial Aid.

A student in residence who is receiving financial assistance based upon need may not, without special permission for an appropriate reason, register an automobile on campus during the academic year for which the aid is granted.

Financial Aid for Continuing Students. Applications for grants-in-aid or renewal of scholarships or grants must be made to the Office of Undergraduate Financial Aid, 614 Chapel Drive. Applications for the several scholarships administered by The Woman's College to upperclass students must be submitted to the office of the Dean of The Woman's College by February 1 prior to the year of the award.

Continuing students are expected to maintain good citizenship and at least a C average, for each semester, to be eligible for financial aid or renewal of most

scholarships or other aid. A. B. Duke scholars are expected to maintain a higher average. Records of students requesting aid are reviewed formally in May by the academic deans of their colleges. Unless there are extraordinary circumstances, I's and X's are assessed as failures in determining academic averages. A continuing student requesting aid is, therefore, advised to see his academic dean if extraordinary circumstances compel him to have an I or an X on any grade report; otherwise, the student may not receive the necessary dean's recommendation for financial aid. The pass/fail option is legitimate for students requesting financial aid. A P grade has the same effect on his grade average as a C.

In case of financial emergency, students should consult with the dean of the appropriate school or college or the Director of Undergraduate Financial Aid.

Awards Available. Awards annually available to undergraduate students at Duke University fall into several major categories as follows:

Angier B. Duke Memorial Scholarships. Recipients of these awards are students whose superior records mark them as young men and young women who give outstanding promise of becoming leaders in their chosen fields of endeavor. Candidates for admission to the freshman classes in Trinity College, The Woman's College, the School of Engineering, and the School of Nursing are eligible to apply.

Number available: Usually forty for each freshman class.

Value: \$500.00 to \$3,700.00 annually.

W. N. Reynolds Memorial Scholarships. Recipients of these awards are students of outstanding ability who have made superior records and show promise of constructive leadership. In considering candidates for the awards, first consideration will be given to:

1. Children of employees of R. J. Reynolds Tobacco Company or any of its affiliates or subsidiaries.
2. Children of families residing in Forsyth County, North Carolina.
3. Other candidates who are residents or natives of North Carolina.

Number available: Four for each freshman class.

Value: \$500.00 to \$3,700.00 annually.

The Mary Duke Biddle Scholarship in Music Composition. This scholarship at a fixed stipend of \$2,500 per year is available to a member of each entering class. It is renewable from year to year so long as the student does satisfactory work. The student wishing to apply for this award will proceed in the normal manner but will be required to submit examples of his music composition. Eligibility is limited to students planning to major in music.

Huguenot Scholarship. A scholarship of \$1,000.00 per year is available from the Huguenot Society of America to a descendant of a Huguenot ancestor.

Christian Vocations Scholarships. Students preparing to enter full-time religious work are eligible to apply for special consideration on the basis of need. These students will be required to submit the Parents' Confidential Statement. Students with need will be recommended by the Director of Undergraduate Financial Aid to the Christian Vocations Scholarship Committee which will consider the vocational commitment of the applicant. Students approved by the Christian Vocations Scholarship Committee are required to sign a note each semester for the amount of financial assistance granted. These notes will be cancelled upon evidence that the student has entered full-time Christian work after graduation.

United Methodist Scholarships. A number of United Methodist Scholarships, valued at \$500.00 per year, are available on a basis of demonstrated need to Methodist students who have given evidence of leadership in their local Methodist Youth Fellowship Groups.

Corporation Scholarships. Certain scholarships financed by private corporations are available annually to undergraduate students at Duke University. The selection of the recipients of these awards is made by the University Scholarship Committee. These scholarships are assigned to students whose records of scholarship and leadership are outstanding and whose financial need can be demonstrated. Value: \$200.00 to \$2,000.00 annually.

Engineering Scholarships. Various scholarship awards are available in the School of Engineering, in addition to certain corporation scholarships. The Jones Scholarship Fund provides scholarship aid to engineering students, with first consideration given to students in civil engineering. Annual awards are also available from the Robert H. Pinnix Scholarship Fund.

Scholarships for Foreign Students. A limited number of awards will be made each year to qualified students from other countries who enter either as freshmen or as students with advanced standing. Candidates for these awards are required to submit the Application for Scholarship and Financial Aid and the Parents' Confidential Statement of the College Scholarship Service provided by the Admissions Office of Duke University.

There are two named awards to bring foreign students to the campus of The Woman's College. They are the Carol Cranmer Scholarship (named for a former student) and the Roberta Florence Brinkley International Scholarship (named for a former Dean of The Woman's College).

Alice M. Baldwin Scholarships. One or more of these scholarships, varying in amount from \$200 to \$2,000, are awarded to rising seniors in The Woman's College on the basis of scholarship, character, and leadership. A confidential financial statement (except in case of those applying for an honorary award) must be filled out by the applicant's parents. A special green form should be filled out by a professor in the department of the applicant's major. A letter from the applicant's house counselor is also required.

Evelyn Barnes Memorial Scholarship. One \$400 or two \$200 grants are awarded to students in any class of The Woman's College who are contributing to the musical life of the University. Scholarship, character, and leadership are considered. A confidential financial statement is required for the \$400 award. The green sheet should be filled out by a member of the music faculty or by the Director of the Chapel Choir. A letter from the house counselor is also required.

Panhellenic-Sandals Scholarship. A scholarship of \$500 is awarded to a member of one of the three upper classes in The Woman's College on the basis of scholarship, character, leadership, and service. No financial statement is necessary.

Delta Delta Delta Scholarship. A scholarship of \$200 is awarded by Delta Delta Delta to a student in The Woman's College on the basis of scholarship and character. The winner of this award is eligible to compete for the national award of a Delta Delta Delta Scholarship of \$1,000.

National Institutes of Health Mental Health Training Grants. A limited number of Mental Health Training Grant Awards are available to qualified junior

and senior student nurses. An award provides for an annual stipend plus tuition fees. Additional information about the Psychiatric Nursing Undergraduate Training Grant Awards may be secured from the Dean of the School of Nursing.

To qualify for an award, the student must have an above average academic record, potential for admission to graduate study, and must declare intent to pursue a career in the field of mental health nursing.

AFROTC College Scholarship Program. Beginning in the second semester of their freshman year, cadets are eligible to compete for AFROTC College Scholarship. This scholarship includes tuition, books, laboratory fees, and \$50.00 a month subsistence. The scholarship is awarded on a merit basis and considers academic achievement, leadership potential, and overall performance. The scholarship can become effective in the sophomore year.

Grants-in-Aid. Recipients of these awards are academically able students who need financial assistance in order to meet the cost of attending college.

Value: From \$100.00 to \$2,500.00 annually.

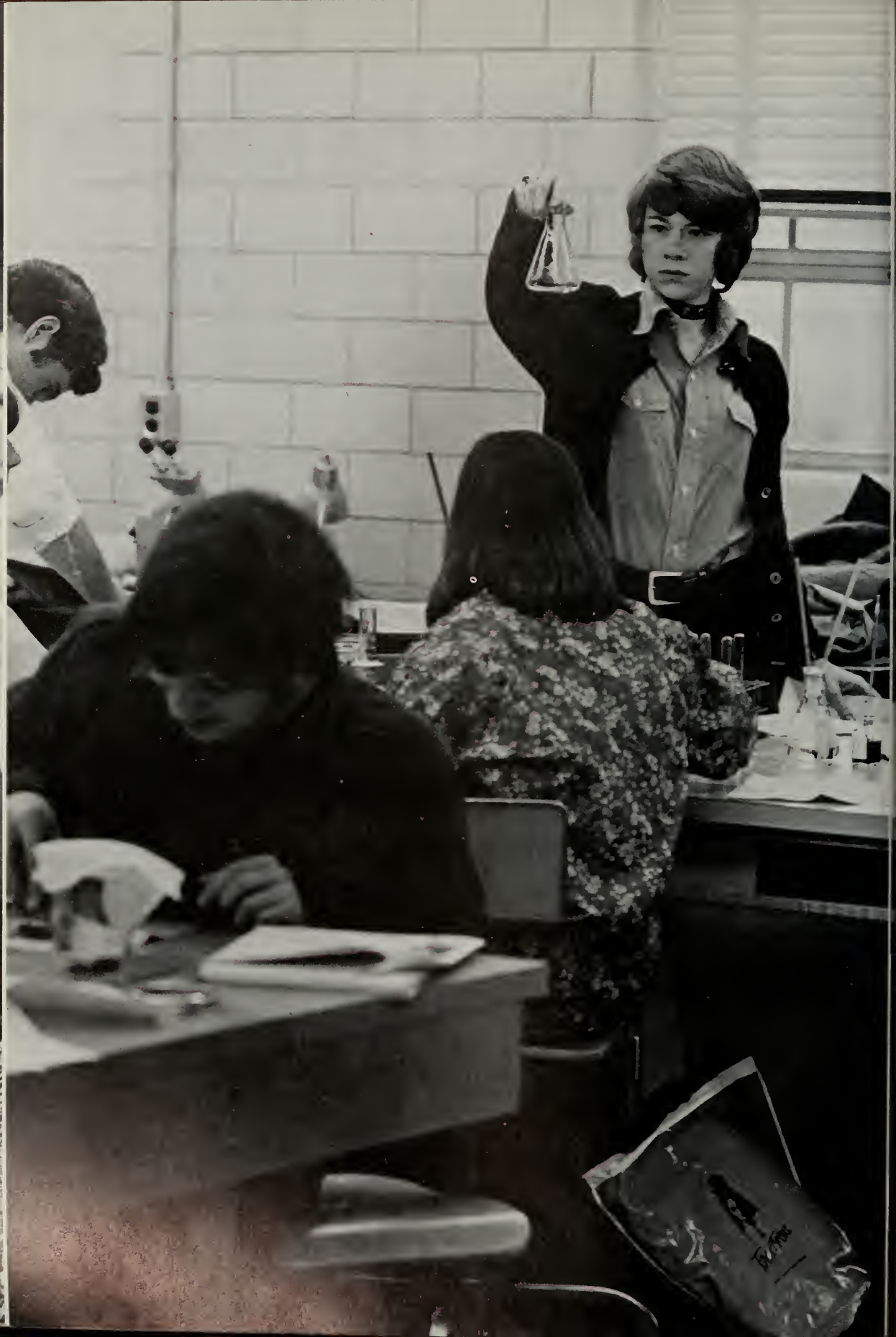
Remission of Tuition. Children of ministers in the North Carolina and Western North Carolina Conferences of the United Methodist Church who are residents in the Conference and children of ministers of all faiths residing in and serving churches in Durham County are eligible to receive a remission of the tuition charge for a maximum of eight semesters of undergraduate study at Duke University.

Loans. Loan funds held in trust by the University as well as funds supplied by the federal government through the National Defense Education Act of 1958 are available to qualified students. Repayment of loans under the National Defense Education Act of 1958 normally begins nine months after the student graduates or leaves college with complete repayment scheduled within a ten-year period. Interest accrues at the rate of 3 percent commencing nine months after the borrower ceases to be a full-time student at an institution of higher education. Special benefits to those teaching in public or private nonprofit elementary and secondary schools and in institutions of higher education permit a portion of the loan to be cancelled depending upon the length of teaching service.

Loan applications must be submitted not later than the July 1 preceding the academic year for which assistance is requested.

Employment Opportunities. The Financial Aid Office maintains an employment service for students who need part-time jobs. There are many opportunities both on the campus and in the city of Durham. A considerable number of students each year help defray their college expenses by working.

Those students accepted for admission to Trinity College, the School of Engineering, and the School of Nursing in need of part-time employment should apply to the Financial Aid Office, Duke University. Students in The Woman's College, upperclassmen, and second-semester freshmen who need and qualify for part-time campus employment should apply to the Assistant Dean of Undergraduate Women, Duke University.



9

Courses of Instruction

Definition of Terms

Courses primarily for freshmen are numbered from 1 to 49; those primarily for sophomores are numbered from 50 to 99; those primarily for juniors and seniors from 100 to 199; those primarily for seniors and graduates from 200 to 299. (See pages 38-39 concerning advanced courses and eligibility for enrollment.)

Odd-numbered courses are usually offered in the fall semester; even-numbered courses in the spring semester. For courses which will be offered in 1972-73, consult the Official Schedule of Courses, available to enrolled students in the Registrar's Office.

Double numbers separated by a hyphen indicate that the course is a year-course and must normally be continued throughout the year if credit is to be received. A student must secure written permission from the instructor in order to receive credit for either semester of a year-course. Double numbers separated by a comma indicate that although the course is a year-course, credit may be received for either semester without special permission.

When *S* is prefixed to course numbers a Summer School offering is designated. The following symbols, suffixed to course numbers, identify "the small-group learning experiences": *S*, seminar; *P*, preceptorial; *T*, tutorial; *D*, discussion section. (For a description of these various course formats, see page 10.)

Art

Professor Covi, *Chairman*; Associate Professor Jenkins, *Director of Undergraduate Studies*; Professors Hall, Heckscher, Markman, Mueller, and Sunderland; Assistant Professors Pratt and Stars; Visiting Artist London; Visiting Assistant Professor Zaborowski; Lecturer Langedijk; Visiting Lecturer Brown; Part-Time Lecturer van Dijk; Part-Time Instructor Thompson

HISTORY OF ART

Introductory courses in art history (Art 61 through 66) are designed as studies in the development of architecture, sculpture, painting, and minor arts as

material manifestations of Western culture from ancient to modern times, with some reference to primitive, Oriental, and other non-Western cultures. A student receives an introduction to the history of art and to methods of art historical analysis through either (a) the study of a major area (Art 61 or 62) and a major period (Art 63, 64, 65, or 66), or (b) two major periods. Only one area course may be taken for credit and no more than two courses in the entire sequence may be taken for credit. Introductory courses are open to freshmen as well as to upperclassmen.

Area Courses

61. Introduction to the History of Architecture and Sculpture. (Not open to students who have taken Art 62.) One course. *Staff*

62. Introduction to the History of Painting and Sculpture. (Not open to students who have taken Art 61.) One course. *Staff*

63. Introduction to Ancient Art. Architecture, sculpture, and painting from prehistoric times through the Roman period. One course. *Markman*

64. Introduction to Mediaeval Art. Development of architecture, sculpture, painting, and related arts, mostly Christian, from about 300 A.D. to about 1400 A.D. One course. *Sunderland*

65. Introduction to Renaissance and Baroque Art. Development of architecture, sculpture, and painting in Western Europe from about 1400 to about 1750. One course. *Jenkins*

66. Introduction to Modern Art. Development of architecture, sculpture, and painting in Europe and America from about 1750 to the present. One course. *Brown*

119. Fine Arts Photography Laboratory. History and development of photography as documentation and art, use of materials, techniques, laboratory, and studio practice. Open to art majors or by permission of instructor. A fee of \$20.00 will be charged, payable upon notification from the Bursar's Office at the beginning of the semester. Half-course. *van Dijk*

131S. Art and Archaeology of the Hellenic World. Preliminary treatment of archaeological material from the Aegean, the geometric, and orientalizing periods, followed by the architecture, sculpture, and vase paintings of ancient Greece from archaic through Hellenistic times. Not open for credit to students who have taken Classical Studies 141. One course. *Markman*

132S. Roman Art and Archaeology. The archaeological background for the formation of the Roman style as derived from Etruscan, Greek, and indigenous Italian sources, followed by the architecture, sculpture, and painting from the early Republic to the end of the empire in Italy, and in the provinces. Not open for credit to students who have taken Classical Studies 142. One course. *Markman*

133. Mediaeval Architecture. A survey of Christian architecture in the Near East, the Balkans, Russia, and Western Europe from the beginnings of the mediaeval style in the late classical period to its disintegration in the fifteenth century. One course. *Sunderland*

134. Mediaeval Painting and Sculpture. A study of painting, including mosaics, manuscripts, stained glass, and sculpture in Western Europe from the late classical period through the fourteenth century. One course. *Sunderland*

135, 136. Art of Northern Europe in the Fifteenth and Sixteenth Centuries. The first semester: Netherlandish painting from the van Eycks to Brueghel with references to French fifteenth century illumination and painting. The second semester: German painting from Witz to Durer, Grunewald, and Holbein, with additional attention to graphic art and sculpture. Two courses. *Mueller*

137, 138. Italian Renaissance Art. A consideration of Italian sculpture and painting in the fourteenth, fifteenth, and sixteenth centuries. The first semester will be devoted to the art of the fourteenth and fifteenth century; the second to that of the sixteenth century. Two courses. *Jenkins*

139S. The Book as an Art Form. From hieroglyphic inscriptions to press books, with particular emphasis upon the relationship of book manufacture and design to its cultural environment. One course. *Sharpe*

140. Seventeenth Century Painting and Sculpture in Europe. This course traces the evolution of the Baroque style in European painting and sculpture, with some attention being given to related manifestations in the late sixteenth and early eighteenth centuries. Particular emphasis is laid on developments in Flanders, France, Holland, and Spain. Prerequisite: Art 61 or 62 or 65 or consent of instructor. One course. *Jenkins*

141. American Art. A survey of architecture, sculpture, and painting in America from the time of the first settlers to the present day, including a consideration of the contributions of the English, Dutch, French, and Spanish to the artistic heritage of the United States. One course. *Brown*

143S. The History of Prints and Drawings. An historical and critical study of drawings and prints from the fifteenth century to the present with reference to functions, values, and relationships to other forms such as painting, sculpture, and the book. One course. *Mueller*

144. Renaissance and Baroque Architecture. A study of the development of Renaissance architecture in Italy from its beginnings in the fifteenth century in the works of Brunelleschi to its flowering in the seventeenth century Baroque works of Bernini and Borromini, along with a consideration of the spread of Italian Renaissance forms to north Europe in the sixteenth century and its development into a Baroque style in the seventeenth century. One course. *Sunderland*

145S-146S. The Rise of Contemporary Architecture. A study of the sources and evolution of the architecture of today, from the eighteenth century conflict between romantic historicism and industrialism to the work of Gropius, LeCorbusier, Wright, and their successors. Seniors graduating at midyear may receive credit for 145, which is otherwise prerequisite to 146. Two courses. *Hall*

147. Painting and Sculpture in the Eighteenth and Nineteenth Centuries. An investigation of the development of painting from the final stages of the Baroque in the eighteenth century to the period of the Impressionist Movement in the last decades of the nineteenth century. One course. *Sunderland*

148. Modern Painting and Sculpture. The history of European painting and sculpture from 1863 to the present day. The course investigates the rise of the anti-academic movements of Impressionism and post-Impressionism in the latter half of the nineteenth century; their outgrowth in Cubism, Expressionism, and Surrealism; and the various abstract styles of the twentieth century. Particular emphasis is placed on such artists as Manet, Renoir, Cezanne, van Gogh, Gauguin, Seurat, Matisse, Picasso, Braque, and Klee. One course. *Brown*

149. Pre-Columbian Art and Archaeology. Architecture, sculpture, pottery, and other arts of the indigenous civilizations in Mexico, Central America, and the Andean region of South America before the Spanish conquest. One course. *Markman*

150. Latin American Art. Architecture, painting, sculpture, and other arts. Emphasis on the architecture of the colonial period. One course. *Markman*

191T, 192T. Independent Study. Directed reading and research. Open only to qualified students in the junior year, by permission of the department. Two courses.

193T, 194T. Independent Study. Directed reading and research. Open only to qualified students in the senior year, by permission of the department. Two courses.

For Seniors and Graduates

217S. Aegean Art. A study of the problems of Aegean art as the forerunner of Greek art and in relation to the contemporary civilization of the Eastern Mediterranean world. One course. *Markman*

218S. Early Greek Art. A study of the problems of the origin and development of Greek art in the Geometric period to the end of the Archaic period. One course. *Markman*

233. Early Mediaeval Architecture. The development of religious architecture from the time of Constantine to the end of the first romanesque style in the third quarter of the eleventh century. One course. *Sunderland*

234. Romanesque Sculpture. The development of sculpture in Western Europe from the early Christian period through the culmination of romanesque art in the west portal of Chartres Cathedral. One course. *Sunderland*

239. Architecture of Britain. After a summary of recent archaeological activity in the British Isles and a survey of mediaeval buildings, the course deals principally with changing architectural problems and their solutions from the advent of the Renaissance onward. Attention is given to the interests of students majoring in history or literature. One course. *Hall*

240. Architecture of North America. A study illustrating the transplantation of European architectural customs since the sixteenth century; the time lag in transit and acceptance of later European developments; the gradual assumption of confident independence in design; and the emergence of international leaders in the United States. One course. *Hall*

241S. Problems in Latin American Art. Architecture, painting, sculpture, and other arts with emphasis on colonial architecture of Central America. Open to seniors who have a reading knowledge of Spanish and/or have had courses in Latin American history, economics, or literature. One course. *Markman*

251S-252S. Research. A course designated to give instruction in methods used in the investigations of original problems. It is open to seniors by permission of the Director of Undergraduate Studies. Two courses. *Heckscher*

253S. Studies in Italian Renaissance Sculpture. One course. *Covi*

254S. The Art of Andrea del Verrocchio and its Influence. One course. *Covi*

255S, 256S. Iconological Problems. Subject matter and sources. Two course. *Langedijk*

291S-292S. Museology Seminar. Operation of a museum; instruction in exhibition and restoration techniques, as well as registration and the researching of art objects with a view to exhibition accompanied by scholarly catalogues. Open to art majors or consent of the instructor. Two courses. *Heckscher and Staff*

DESIGN

53-54. Beginning Studio. Experiment and practice with formal elements of composition in various media. Prerequisite: consent of the instructor. Two courses. *Pratt*

153, 154. Painting. Individual and group criticism and discussion of important historic or contemporary ideas in painting. Prerequisites: Art 53-54 and consent of the instructor. Two courses. *Pratt*

155, 156. Advanced Drawing and Color. Prerequisite: Art 53-54. Two courses. *Pratt*

159, 160. Printmaking. Wood engraving, block printing, copperplate engraving, etching, aquatint, and drypoint. Prerequisite: Art 53-54. Two courses. *Mueller and Thompson*

164. Ceramics. The design, production, and conceptualization of three-dimensional forms. One lecture and four studio hours each week. One course. *Stars*

181, 182. Individual Project. Independent work open to highly qualified seniors on recommendation of the instructor and invitation of the department. Two courses.

257, 258. Advanced Painting. Prerequisites: Art 153 and 154. Two courses. *Pratt*

DEPARTMENTAL MAJOR

The student will elect a sequence of courses emphasizing either the history of art or design.

Major in History of Art

Prerequisites. Introduction to art history, two courses (61 or 62 and one course from 63, 64, 65, or 66, or two courses from 63, 64, 65, or 66).

Major Requirements. Eight courses in art history exclusive of 61 through 66 and including no less than two courses at the 200 level.

Major in Design

Prerequisites. Introduction to art history, two courses (61 or 62 and one course from 63, 64, 65, or 66, or two courses from 63, 64, 65, or 66). Art 53-54, two courses.

Major Requirements. Five studio courses exclusive of Art 53-54.

The department offers work leading to graduation with distinction. See the section on honors in this *Bulletin*.

Studio Fees. A fee of \$25.00 per semester will be required in all studio courses, including Art History 119, to cover materials used in each course. The fee is payable upon notification from the Bursar's Office at the beginning of each semester.

Asian and African Languages

CHINESE

131, 132. Intensive Elementary Chinese. Four hours of classroom work, two hours of language drill. Two courses. *Rolf*

133, 134. Intensive Intermediate Chinese. Four hours of classroom work, two hours of language drill. Two courses. *Rolf*

135, 136. Introduction to Modern Chinese Literature. Prerequisites: Chinese 133 and 134 or equivalent. Two courses. *Rolf*

HINDI-URDU

171, 172. Studies in Indian Literatures. Readings in translation. First semester: classical Indian literary traditions. Second semester: literatures from Indian languages, including novels, poetry, and drama, with special reference to European literary influences. Two courses. *Shonek*

181, 182. Intensive Elementary Hindi-Urdu. Four hours of classroom work; two hours of language drill. Concentration on the acquisition of conversational ability in Hindi-Urdu, with a grammar and vocabulary basic to both Hindi and Urdu. Introduction to the Devanagari script and the reading of graded texts. Two courses. *Staff*

183, 184. Intensive Intermediate Hindi-Urdu. Four hours of classroom work; two hours of language drill. Advanced conversation in Hindi-Urdu reading and composition. Prerequisite: elementary Hindi-Urdu. Two courses. *Staff*

185, 186. Advanced Hindi Reading and Composition. An introduction to scholarly and literary Hindi prose and extensive practice in composition. Prerequisites: Hindi-Urdu 183, 184, or equivalent. Two courses. *Staff*

200, 201. Special Studies in South Asian Languages. Intensive concentration in advanced Hindi reading and conversation, or specialized, graded work in cognate South Asian languages necessary for the advanced student contemplating field work in South Asia. Prerequisite: consent of instructor. Two courses. *Staff*

These courses are offered as an enrichment program for students interested in the South Asian subcontinent and may be taken as general electives by advanced undergraduate students. No major work is offered in Hindi-Urdu.

JAPANESE

151, 152. Elementary Japanese. Four hours of classroom work, two hours of language drill. Two courses. *Rolf*

153, 154. Intensive Intermediate Japanese. Four hours of classroom work, two hours of language drill. Two courses. *Rolf*

155, 156. Introduction to Modern Japanese Literature. Prerequisite: Japanese 153, 154 or equivalent. Two courses. *Rolf*

SWAHILI

101, 102. Elementary Swahili. Three hours of classroom work, plus language drill. Two courses. *Opeyo*

Biology

11-12. An Introduction to Biology. Adaptation and diversity of plants and animals; their evolution, ecology, structure, function, and significance to man and his environment. Open to entering freshmen who have had no more than one year of biological science in high school, and to upperclassmen only with the consent of a director of undergraduate studies in either botany or zoology. Lectures and laboratories. Two courses. *Staff*

11P, 12P. Preceptorials. Elective preceptorials for students enrolled in Biology 11, 12. *Staff*

14. An Introduction to Biology. Nature of plants and animals, their origin, evolution, and development. Introduction to major concepts and methodology relevant to current problems. Open to freshmen with at least one year of biological science in high school and to all upperclassmen. Lectures and laboratories. (Offered in fall and spring terms.) One course. *Staff*

14P. Preceptorial. Elective preceptorial for students enrolled in Biology 14.

The above offerings, 11-12 and 14, may not both be taken for credit; either is an acceptable prerequisite for advanced courses. See other courses listed under *Botany* and *Zoology*.

Black Studies

Assistant Professor Burford, *Director*; Assistant Professors Gavins, Olela; Visiting Professor Ray; Visiting Lecturer Clarke; Assistant Dean and Student Adviser Wallace

Black Studies is designed to provide instruction and study directed toward the concerns and particular experience of Black America. Though intensive work (a major) is quite worthwhile and encouraged, Black Studies recognizes many of its course offerings as important to most students' primary fields of endeavor as well as an essential component of the liberal arts education.

100. Philosophy of Black Liberation. One course. *Staff*

83, 84. Afro-American History. (See History 83, 84.) Two courses. *R. Gavins*

99. Dimension of Racism. The nature of racism, its interconnection with aspects and institutions of American life and effects. One course. *Staff*

113. African Philosophy. Religious and political philosophy of twentieth century Africa. One course. *Olela*

125. Religion and Theology of Black America. (See Religion 125.) One course. *Burford*

147. The Black in the City. (See Sociology 147.) One course.

150. Third World Literature. Selected works with special emphasis upon Black American, African, and Caribbean writers. One course. *A. Clarke*

151. Classic Literature of Black America. Works by Black authors of the Negro renaissance followed by Wright's *Native Son* and Ellison's *Invisible Man*. One course. *Ray*

152. Contemporary Literature of Black America. Essays, poetry, and fiction by contemporary Black writers. One course. *Clarke*

176. Marxism and Black Liberation. Marxist perspective on the liberation of Black America. One course. *Olela*

189. Special Topics. Spring 1972: Black Intellectualism. One course. *Clarke*

191, 192. Independent Study. Two courses. *Staff*

193, 194. Independent Study in Community or Field Work. Two courses. *Staff*

195-196. Problems in Afro-American History. (See History 195V-196V.) Two courses. *Gavins*

DEPARTMENTAL MAJOR

1. Black Studies 99 and 100 required for major and strongly recommended as introductory to course work in Black Studies.

2. Black History 83, 84 required.

3. Black Studies 193, 194 required. (It is suggested that the student seek his own community assignment and request approval.)

4. Three other courses above 100 to be selected with at least one being a seminar (one of which may include 193 or 194 but not both).

Students majoring in Black Studies will receive special counselling in planning their course of study and considering future vocation.

Botany

Professor Wilbur, *Chairman*; Associate Professor White, *Director of Undergraduate Studies*; Professors Anderson, Billings, Culberson, Hellmers, Johnson, Kramer, Naylor, Philpott, and Stone; Associate Professors Searles and Strain; Assistant Professors Antonovics and Boynton; Lecturer C. F. Culberson

See *Biology* for listing of introductory courses.

52. Plant Identification. Practice in the identification of local plants and a study of the principles underlying plant classification. Laboratory, lectures, and field trips. One course. *Wilbur*

53. Introductory Oceanography. Basic principles of physical, chemical, biological, and geological oceanography. Prerequisite: one year of a laboratory science or concurrent enrollment in a laboratory science. (Also listed as Geology 53.) One course. *Pilkey (Geology) and Searles*

55. Plant Anatomy. A comparative study of basic cell types, tissues, and organs of vascular plants. Correlation of anatomical information with pertinent literature, application of anatomy to problems in systematics and evolution, and the interrelationship between structure and function. Prerequisite: one year of biology or permission of instructor. One course. *White*

103. General Bacteriology.* A study of the morphology and fundamental physiological processes of bacteria: their relationship to sanitation, public health, soil fertility, and food preservation. Prerequisite: introductory biology. One course. *Johnson*

105. Plant Diversity. Major groups of the living plants, their evolutionary origins and phylogenetic relationships. Prerequisite: introductory biology. One course. *Culberson and White*

151. Introductory Plant Physiology. The principal physiological processes of plants, including water relations, mineral nutrition, synthesis and use of foods, and growth phenomena. Prerequisites: introductory college biology and one year of chemistry. One course. *Hellmers and Kramer*

156. Plant Ecology. Principles of the relationships between plants and their environments. Structures and processes of ecosystems. Laboratory, lectures, and field trips. Prerequisites: introductory biology. One course. *Billings and Strain*

169. The Marine Environment. (For description see Marine Sciences.)

171. Marine Sciences Seminar. (For description see Marine Sciences.)

180. Principles of Genetics. Structure and properties of genes and chromosomes, and evolution of genetic systems. Prerequisites: introductory courses in biology, chemistry, and mathematics or equivalent. (Also listed as Botany 280, Zoology 180, and Zoology 280.) With or without laboratory. One course. *Antonovics, Boynton, and Gillham (Zoology)*

* Not offered in 1972-73.

186. Evolution. Analyses of the processes of adaptation and diversification of individuals, populations, and genetic systems. Prerequisites: introductory biology and genetics, or consent of instructors; cytology is recommended. (Also listed as Zoology 186, 286 and under the University Program in Genetics.) Not open to students who have had Zoology 109 or Botany 240. With or without laboratory. One course. *Antonovics and Lundberg (Zoology)*

191T, 192T, 193T, 194T. Independent Study. Directed reading and research. Open only to highly qualified students in the junior and senior years by permission of the department. Credits to be arranged. *Staff*

195S, 196S. Seminar in Botany. Credits to be arranged. *Staff*

209. Lichenology. Morphology, systematics, and biological and ecological implications of the lichens. Collection and identification of specimens and the use of lichen chemistry in taxonomy. One course. *Culbertson*

210. Bryology. Morphological, systematic, and ecological characteristics of mosses and liverworts. One course. *Anderson*

212. Phycology.* Morphological and ecological characteristics of common freshwater and marine algae and principles of their classification. One course. *Searles*

221. Mycology.* Field and laboratory study of vegetative and reproductive structures of the fungi and slime molds. Methods of collection, isolation, propagation, and identification of the major orders as represented in local flora. Prerequisite: one year of biological science. One course. *Johnson*

225ST, 226ST. Special Problems. Students with adequate training may do special work in the following fields:

1. Mycology. *Johnson*
2. Cytology. *Anderson and Boynton*
3. Ecology. *Billings and Strain*
4. Genetics. *Antonovics and Boynton*
5. Morphology and Anatomy of Vascular Plants. *Philpott and White*
6. Bryology. *Anderson*
7. Physiology. *Hellmers, Kramer, and Naylor*
8. Taxonomy of Vascular Plants. *Stone and Wilbur*
9. Bacteriology. *Johnson*
10. Lichenology. *Culbertson*
11. Phycology. *Searles*
12. Biology. *Staff*

243. Cytology. The structural and functional organization of cells. Lectures, readings, and conferences. Prerequisite: one year of botany or zoology. (Also listed as Zoology 243.) One course. *Anderson and Nicklas (Zoology)*

250. Plant Biosystematics. Basic descriptive and experimental procedures for the study of vascular plant evolution. Prerequisites: Botany 52 and 55 and either Botany 243 or a course in genetics, or their equivalents. One course. *Stone*

*Not offered in 1972-73.

252. Plant Metabolism. The physiochemical processes and conditions underlying the physiological processes of plants. Prerequisite: Botany 151 or equivalent; organic chemistry is recommended. One course. *Naylor*

254. Plant-Water Relations. A study of factors affecting the availability of water, its absorption and use in plants, and the effects of water deficits on plant processes. Prerequisite: Botany 151 or equivalent. One course. *Kramer*

255. Plant Systematics. A study of the historical background of plant taxonomy, modern concepts and systems of classification, nomenclatural problems, and the taxonomy of specialized groups. Prerequisite: Botany 52 or equivalent. One course. *Stone and Wilbur*

257. Principles of Plant Distribution.* Interpretation of floristic and ecological plant geography. Prerequisite: Botany 156 or equivalent. One course. *Billings*

258. Physiology of Growth and Development. Consideration of the internal factors and processes leading to the production of new protoplasm and its differentiation at the cellular, tissue, and organ level in plants. Prerequisite: Botany 151 or equivalent; organic chemistry is recommended. One course. *Naylor*

259. The Environment.* Environmental principles; methods of obtaining and evaluating environmental data for ecological purposes with special attention to instrumentation and microclimate. Prerequisite: Botany 156 or equivalent. One course. *Billings*

265. Physiological Plant Ecology. The physiological approach to interpreting adaptation in plants, with emphasis on terrestrial seed plants. One course. *Strain*

266. Analysis and Classification of Vegetation. The concepts and methods of synecology; modern approaches with a review of historical aspects. One course. *Strain*

283. Developmental and Cellular Genetics. A seminar and lecture course devoted to current literature. Prerequisites: Botany 180 or 280 or equivalent and consent of instructor. (Also listed as Zoology 283 and under the University Program in Genetics.) Half-course. *Boynton and Gillham (Zoology)*

MARINE LABORATORY

Botany S205, Marine Microbiology, and S220, Coastal Field Botany, are offered in alternate years at the Duke University Marine Laboratory, Beaufort, N. C.; *Botany S211, Marine Phycology*, is offered annually. Consult the *Bulletin of the Marine Laboratory* for further information.

THE UNIVERSITY PROGRAM IN GENETICS

Genetics courses offered by the Botany Department are an integral part of this interdepartmental program. Refer to the announcement in this *Bulletin* under *Genetics, the University Program* for description of the other offerings.

*Not offered in 1972-73.

DEPARTMENTAL MAJOR

For the B.A. Degree

Prerequisites. Introductory biology or advanced placement in botany; Chemistry 1-2 or advanced placement in chemistry; one semester of college mathematics or equivalent.

Major Requirements. A minimum of five courses selected from the following: Botany 52 (Systematics), 55 (Anatomy), 105 (Morphology), 180 (Genetics), 151 (Physiology), 156 (Ecology). With approval of the Director of Undergraduate Studies, one or more of these courses may be taken in a related department.

Beyond these few basic courses a student's particular program will be tailored to his current interests and future plans.

For the B.S. Degree

Prerequisites. Introductory biology or advanced placement in botany; Chemistry through organic chemistry; Mathematics 31, 32, or an equivalent year of college mathematics.

Major Requirements. A minimum of five courses selected from the following: Botany 52 (Systematics), 55 (Anatomy), 105 (Morphology), 180 (Genetics), 151 (Physiology), 156 (Ecology). With approval of the Director of Undergraduate Studies, one or more of these courses may be taken in a related department. One year of college physics, or equivalent, a course in statistics, and proficiency in two foreign languages are recommended.

The emphasis in this preprofessional program will depend on the student's particular interests. Specific programs will be arranged on an individual basis.

Interdepartmental Concentration

A student, while majoring in botany, may take course work in two or more science disciplines to such depths that requirements for the conventional major cannot be met. By joint consent of the appropriate departments, major-related interdepartmental programs may be pursued instead.

Chemistry

Professor Quin, *Chairman*; Associate Professor Wells, *Director of Undergraduate Studies*; Associate Professor Bonk, *Supervisor of Freshman Instruction*; Professors Bradsher, Brown, Chesnut, Hobbs, Jeffs, Krigbaum, Parham, Poirier, Smith, Strobel, and Wilder; Associate Professors McPhail and Palmer; Assistant Professors Baldwin, Crumbliss, Gutknecht, Henkens, Lochmuller, and Porter

1, 2. General Inorganic Chemistry. Lectures and recitations on the elementary principles of chemistry and on the structure, properties, preparation, and uses of the elements and their compounds. The laboratory work includes qualitative analysis of some of the more common metals. Two lectures, one recitation, and three laboratory hours. Chemistry 1 is a prerequisite for Chemistry 2. Prerequisite: qualification for Math 31. Two courses. *Bonk and Staff*

1P, 2P. Preceptorial. Elective preceptorials for students enrolled in Chemistry 1, 2. *Staff*

42. Advanced General Chemistry. An honors course paralleling Chemistry 2 on a more theoretical level. Emphasis is given to molecular structure, inorganic chemistry, and solution equilibria. Selection for the course will be based upon a distinguished performance in Chemistry 1 and interest in a B.S. science major. One course. *Strobel and Crumbliss*

61. Introductory Physical and Quantitative Chemistry. An intensive study of chemical equilibria with special attention to the physical chemistry of aqueous solutions, chemical kinetics, and elementary thermodynamics. Laboratory experiments illustrate the principles of analytical chemistry and instrumental analysis. One lecture, one recitation, and six laboratory hours. Prerequisites: Chemistry 1, 2 and Mathematics 31. One course. *Gutknecht, Lochmuller, McPhail, Poirier, and Wilder*

61P. Preceptorial. Elective preceptorial for students enrolled in Chemistry 61. *Staff*

131. Modern Chemical Analysis. Quantitative and instrumental techniques in analysis; selected topics in clinical analysis. Theoretical and applied aspects. Two lectures and six laboratory hours per week. Prerequisite: Chemistry 160 or 161. One course. *Gutknecht, Lochmuller, and Strobel*

132. Quantitative and Instrumental Analysis. Practice in advanced quantitative analysis and in the use of chemical instrumentation in analysis. A discussion of the theoretical and applied aspects of chemical and instrumental methods of analysis. Two lectures and six laboratory hours per week. Prerequisites: Chemistry 161, 162; Chemistry 162 may be taken concurrently. One course. *Gutknecht, Lochmuller, and Strobel*

151, 152. Organic Chemistry. An introduction to the study of the compounds of carbon in which the chemistry of both aliphatic and aromatic compounds is considered. Laboratory experiments are selected to illustrate the more important reactions and preparations of organic compounds. Three lectures and three laboratory hours. Prerequisite: Chemistry 61 or permission of Director of Undergraduate Studies; Chemistry 151 is prerequisite for 152. Two courses. *Baldwin, Bradsher, Brown, Porter, Quin, and Wilder*

152P. Preceptorial. Elective preceptorial for students in Chemistry 152. *Staff*

155. Qualitative Organic Analysis. Systematic identification of organic compounds based upon a study of physical and chemical properties. Infrared, ultraviolet, and NMR spectra are used in elucidation of structure. Two lectures and six laboratory hours per week. Prerequisite: Chemistry 152. One course. *Porter and Quin*

160. Elements of Theoretical Chemistry. A one semester course in the principles of physical chemistry. Credit is not given for both 160 and 161. Two lectures, one recitation, and three laboratory hours. Prerequisites: Chemistry 61, Physics 51-52, and Mathematics 32. One course. *Chesnut, Henkens, Hobbs, and Smith*

161, 162. Physical Chemistry. Fundamentals of theoretical chemistry illustrated by selected laboratory experiments. Two lectures, one recitation, and

three laboratory hours. Prerequisites: Chemistry 61, Physics 51-52, and Mathematics 73. Two courses. *Hobbs, Krigbaum, and Smith*

191, 192. Independent Study. Supervised reading and research. Open to students by permission of the department. Two courses. *Staff*

193, 194. Independent Study. Supervised reading and research. Open to students who have completed Chemistry 191, 192, and by permission of the department. Two courses. *Staff*

195, 196. Seminar. Seminars open to junior and senior students in analytical, inorganic, organic, and physical chemistry. Two courses. *Staff*

216. Nuclear Chemistry. Elementary theory of nuclear reactions and properties of radioisotopes. Main emphasis on the use of tracers in chemical applications and chemical isotope effects. Two lectures and three laboratory hours. Prerequisites: Physics 51-52 and Chemistry 160 or 161, either of which may be taken concurrently. One course. *Lochmuller*

217. Inorganic Chemistry. An advanced study of the bonding, structures, and reactions of inorganic compounds based on modern physical chemical concepts. Three lectures. Prerequisite: Chemistry 162 or the permission of the Director of Undergraduate Studies. One course. *Crumbliss, Palmer, and Wells*

234. Chemical Instrumentation. Physicochemical principles as applied to instrumental methods of analysis, illustrated by laboratory experiments with emphasis on methods involving electrical techniques. Two lectures and three laboratory hours per week. Prerequisites: Chemistry 132 and Chemistry 162; the latter may be taken concurrently. One course. *Strobel*

240. Chemical Oceanography. Physicochemical properties of seawater. Lectures, laboratory work, and field trips. Prerequisites: a year of analytical or physical chemistry, an introductory course in general or physical oceanography, or permission of the instructor. (Listed also as Zoology 240.) Given at Beaufort. Two courses. *Staff*

252. Advanced Organic Preparations. Laboratory experiments on fundamental organic processes, techniques, and theories. One discussion period and six consecutive hours of laboratory per week. Prerequisite: Chemistry 152. One course. *Brown*

253, 254. Structural and Physical Organic Chemistry. First semester: stereochemistry, aromaticity, linear free energy relationships, and the structure of carbonium ions. Second semester: orbital symmetry, photochemistry, free radicals, and other reactive intermediates. Three lectures per week. Chemistry 253 is a prerequisite for Chemistry 254. Prerequisites: Chemistry 152 and permission of the Director of Undergraduate Studies. Two courses. *Porter and Wilder*

255. Structural Analysis by Spectroscopic Methods. The application of modern spectral methods of structure analysis of organic compounds. Three lectures per week. Prerequisites: Chemistry 155, 253, and permission of the Director of Undergraduate Studies. One course. *Jeffs*

256. Synthetic Methods and Organic Reactions. The scope and limitations of reactions of organic chemistry and their use in organic synthesis. Three lectures per week. Prerequisites: Chemistry 253 and the permission of the Director of Undergraduate Studies. One course. *Baldwin and Bradsher*

261. Spectroscopy and Molecular Structure. Introduction to principles of physical techniques employed in the elucidation of molecular structure, including topics such as symmetry, diffraction, magnetic resonance, and optical spectroscopy. Two lectures per week. Prerequisites: Chemistry 162 and permission of the Director of Undergraduate Studies. Half-course. *McPhail and Physical Chemistry Staff*

263. Thermodynamics. Review of classical thermodynamics, including application of chemical potentials to the treatment of equilibria in multi-component systems. Elementary statistical thermodynamics; use of partition functions for the ideal monatomic gas, harmonic oscillators, and rigid rotators. Derivation of Debye-Huckel equation; special topics. Two lectures per week. Prerequisites: Chemistry 162 and permission of Director of Undergraduate Studies. Half-course. *Hobbs, Krigbaum, and Smith*

264. Biophysical Chemistry. Application of the principles and techniques of physical chemistry to biological problems. Three lectures per week. Prerequisite: Chemistry 160 or 161. One course. *Henkens*

267. Introductory Quantum Mechanics. The fundamentals of quantum mechanics with elementary applications. Linear algebra; the uncertainty relations; the harmonic oscillator; hydrogen-like systems; angular momentum; perturbation theory; chemical bonding; time-dependent phenomena. Three lectures per week. Prerequisites: Chemistry 162 and permission of the Director of Undergraduate Studies. One course. *Chesnut*

271. Introduction to Research. Lectures on the use of chemical literature and on special areas of chemical research. Oral and written reports by the students on topics selected from current chemical literature. Half-course. *Brown*

DEPARTMENTAL MAJOR

For the A.B. Degree

Prerequisites. Chemistry 1 and 2 or Chemistry 1 and 42 or advanced placement; Mathematics 31, 32; Physics 51-52.

Major Requirements. Chemistry 61, 131 or 132, 151, 152, 160 (or 161), and usually 191-192 or 195-196. If neither independent study (191-192) nor seminar (195-196) is taken in chemistry, one 200-level chemistry course or Chemistry 155 or Chemistry 162 must be taken to complete the major.

Recommended. Two semesters of a foreign language or the equivalent.

For the B.S. Degree

Prerequisites. Chemistry 1 and 2 or 1 and 42 or advanced placement; Mathematics 31, 32, 73; Physics 51-52; two semesters of German or Russian or the equivalent.

Major Requirements. Chemistry 61, 131 or 132, 151, 152, 155, 161, 162, 217 and two courses selected from 191-192 or 195-196.

Recommended. Physics 161; Mathematics 51, 74, or 111.

Students planning graduate study in chemistry should complete one college year (or its equivalent) of a second language usually chosen from one of the above and take additional courses in mathematics and physical sciences (see departmental adviser).

Classical Studies

Professor Oates, *Chairman*; Assistant Professor Burian, *Director of Undergraduate Studies*; Professors Newton, Richardson, Truesdale, and Willis; Associate Professor Stanley; Assistant Professors Nixon and Rigsby

GREEK

1-2. Elementary Greek. A study of grammar and an introduction to reading. Two courses. *Willis*

63-64. Intermediate Greek. Introduction to Greek prose and poetry. First semester: Plato's *Apology of Socrates* and two dialogues. Second semester: two plays of Euripides. Two courses. *Truesdale*

87, 88. Sight Reading in Greek Prose. Readings from easy Attic prose writers. Open to students who have completed one year of college Greek, or the equivalent, with consent of the instructor. Two hours per week throughout the year. Two half-courses. *Truesdale*

95S. Seminar in Greek: Homer. One course. *Stanley*

96S. Seminar in Greek: The Lyric Poets. One course. *Stanley*

97S. Seminar in Greek: Tragedy.* One course. *Staff*

98S. Seminar in Greek: Comedy.* One course. *Burian*

99S. Seminar in Greek: The Historians.* One course. *Stanley*

100S. Seminar in Greek: The Orators.* One course. *Burian*

117. Greek Prose Composition. The character of the course is determined by the needs of the students enrolled. Half-course. *Truesdale*

191, 192. Independent Study. Directed reading and research. Open only to highly qualified juniors and seniors. Two courses. *Staff*

198S, 199S. Senior Seminar in Greek. The seminar will change according to the interests of the instructor. Two courses. *Staff*

For Seniors and Graduates

200. Graduate Reading. Open to qualified undergraduates by permission of instructor. One course. *Truesdale*

*Not offered in 1972-73.

203. Homer.* The *Iliad* and *Odyssey*; the problems of language and structure in the epic; present state of Homeric scholarship. One course. *Stanley*

205. Greek Lyric Poets.* Fragments of the early lyric poets; selected odes of Pindar and Bacchylides. One course. *Truesdale*

206. Aeschylus.* The *Oresteia*, with study of the form of *Agamemnon* and its place in the design of the trilogy. One course. *Willis*

208. Sophocles.* The Theban plays; the structure and style of Sophoclean tragedy. One course. *Willis*

209. Euripides.* Representative tragedies in their political and philosophical context; analysis of dramatic form and texture. One course. *Stanley*

210. Aristophanes. Origin and development of Greek comedy; representative plays of Aristophanes. One course. *Truesdale*

221. Early Greek Prose. Greek prose in the fifth century from the Ionian scientists and logographers to Herodotus; Gorgias, Antiphon, and the Old Oligarch. One course. *Willis*

222. Thucydides.* The *History*; Thucydides' historical method and style. One course. *Willis*

223. Greek Orators I.* Early fourth century rhetoric, including Andocides, Lysias, and Isocrates. One course. *Staff*

224. Greek Orators II.* Aeschines' *Against Ctesiphon* and Demosthenes' *On the Crown* in the light of fourth-century political history and rhetorical development. One course. *Willis*

225. Plato.* Selected dialogues and related passages illustrating the development of philosophical topics and stylistic motifs. One course. *Stanley*

231. Hellenistic Poetry.* The principal lyric, elegiac, pastoral, and didactic poets of Alexandria; emphasis on Callimachus and Theocritus. One course. *Stanley*

241. Advanced Prose Composition. Xenophon, Lysias, and other prose authors as models of style and practice in the writing of Attic prose. Half-course. *Willis*

LATIN

1-2. Elementary Latin. Study of the structure of the language (inflexions, vocabulary, syntax, and pronunciation). Second semester: readings in prose and poetry. Two courses. *Staff*

63. Intermediate Latin. Selected prose. One course. *Burian and Newton*

*Not offered in 1972-73.

64. Intermediate Latin: Vergil. Readings from the *Aeneid*; lectures on the epic and its history and Vergil's style and technique. One course. *Burian and Newton*

87, 88. Sight Reading in Classical, Mediaeval, and Renaissance Latin. Offered especially for students in fields other than classical studies who wish to maintain and refresh their Latin. Two hours per week throughout the year. (Open to students enrolled in other courses in Latin only on the recommendation of their instructors.) Two half-courses. *Staff*

90. (Not a course. This number represents one course credit for advanced placement.)

95S. Seminar in Latin: Ovid. One course. *Newton*

96S. Seminar in Latin: Lucretius. One course. *Richardson*

97S. Seminar in Latin: The Lyric and Elegaic Poets.* One course. *Richardson*

98S. Seminar in Latin: The Historians.* One course. *Staff*

99S. Seminar in Latin: Comedy.* One course. *Richardson*

100S. Seminar in Latin: The Novel.* One course. *Richardson*

117. Latin Prose Composition. The character of the course is determined by the needs of the students enrolled. Half-course. *Staff*

191, 192. Independent Study. Directed reading and research. Open to highly qualified juniors and seniors. Two courses. *Staff*

198S, 199S. Senior Seminar in Latin. The seminar will change according to the interests of the instructor. Two courses. *Staff*

For Seniors and Graduates

200. Graduate Reading. Open to qualified undergraduates by permission of instructor. One course. *Rigsby*

201. The Verse Treatise.* The genre of didactic poetry; emphasis on Lucretius' *De Rerum Natura*, Vergil's *Georgics*, and Ovid's *Ars Amatoria*; attention to Cicero's *Aratea*, the *Astronomica* of Manilius, Horace's *Ars Poetica*, and Ovid's *Fasti*. One course. *Richardson*

202. Roman Satire.* A survey of the genre, with concentration on Horace, Juvenal, and Persius. One course. *Staff*

203. Epic: Vergil.* The *Aeneid*. One course. *Newton*

204. Epic: Lucan and Statius.* The development of the Roman epic in the Silver Age. One course. *Richardson*

*Not offered in 1972-73.

207. The Prose Epistle.* The letter as a vehicle of communication and as a literary form. One course. *Richardson*

208. The Epistle in Verse. The verse letter as a literary form; reading in the *Epistles* of Horace, the *Heroides* of Ovid, and Statius. One course. *Staff*

209. Fragments of Early Latin.* The remains of Latin poetry of the third and second centuries B.C., from Livius Andronicus to Lucilius, with emphasis on the epic and drama of Ennius. One course. *Stanley*

210. Lyric and Occasional Poetry.* Shorter verse forms: epigram, pastoral, song, and panegyric. One course. *Staff*

211. Roman Oratory I.* The literary history and criticism of Roman oratory. One course. *Richardson*

212. Roman Oratory II.* A continuation of Latin 211. One course. *Staff*

221. Mediaeval Latin I. Latin literature of late antiquity, from Prudentius to the Carolingian Revival. One course. *Newton*

222. Mediaeval Latin II.* Literature in Latin from Charlemagne to the Renaissance. One course. *Newton*

241. Advanced Latin Composition. Experiments in imitation of the great Latin prose styles and introduction to the composition of verse. Half-course. *Richardson*

CLASSICAL STUDIES

51. Greek Literature in English Translation. Reading in translation of major Greek authors, with emphasis on the Homeric epic and the Attic drama. One course. *Burian and Truesdale*

52. Latin Literature in English Translation. Reading in translation of major Roman authors, such as Plautus, Terence, Vergil, Horace, Ovid, Petronius, Juvenal, Tacitus, and Apuleius. One course. *Burian and Stanley*

53. Greek History. The political and intellectual history of the Hellenes from earliest times to the death of Alexander the Great. One course. *Oates*

54. Roman History. The Roman republic and empire to the Council of Nicaea. One course. *Oates*

55. Greek Art and Archaeology. Greek architecture, sculpture, and painting from the Bronze Age to the classical period. Study of objects in the Duke Classical Collection is included. One course. *Stanley*

56. Roman Art and Archaeology. Rome's achievement in architecture and decoration, portraiture, and relief sculpture; from the Villanovans to the Antonine emperors. One course. *Stanley*

*Not offered in 1972-73.

57S, 58S. Seminar in Classical Studies. Aspects of the history, art, and literature of classical Greece and Rome. For freshmen and sophomores. Two courses. *Staff*

113. Ancient Historians and Historiography.* Theory and practice of Herodotus, Thucydides, Polybius, Livy, Sallust, Tacitus, and Ammianus Marcellinus. One course.

114. Greek Drama. Reading in English translation of Aeschylus, Sophocles, Euripides, Aristophanes, and Menander. (Not open to students who have taken Classical Studies 51.) One course. *Truesdale*

115. The Classical Tradition.* The notion of the "classical" from the creation of the archetype to the present. One course. *Burian*

116. Criticism of the Arts and Letters in Antiquity.* Aesthetic theory and practical criticism among the Greeks and Romans. One course.

117. Ancient Mythographers.* Myth in classical and mediaeval writers from Hesiod to Boccaccio. One course. *Newton*

134. The Athenian Empire.* Imperial democracy at Athens and its consequences for the *polis*. One course. *Staff*

135. Alexander the Great. His career and the effects of his conquests. One course. *Staff*

136. The Hellenistic Kingdoms. The Greek world from the death of Alexander in 323 B.C. to the end of the second century B.C. One course.

137. The Roman Revolution.* Rome from the time of the Gracchi (133 B.C.) to the death of Augustus (14 A.D.). One course.

138. The Decline and Fall of Rome.* Rome from the death of Commodus to the accession of Constantine. One course.

143. The Ancient Cities of Greece.* The *polis* as a physical and societal complex; urban problems and their solutions through the centuries. A different Greek city that has been extensively excavated and well published is chosen as representative of each century and examined in detail. One course. *Richardson*

144. Ancient Cities: Rome and Her Colonies.* As a metropolis and a cosmopolis; the sources and uses of significant architectural and urbanistic ideas; the city government and organization of the megalopolis; Roman colonies throughout the Empire. One course. *Richardson*

191, 192. Independent Study. Directed reading and research. Open only to highly qualified juniors and seniors. Two courses. *Staff*

195S, 196S. Junior Seminar in Classical Studies. The seminar will change each year according to the interest of the instructor. Two courses. *Staff*

* Not offered in 1972-73.

For Seniors and Graduates

231. Greek Sculpture.* Techniques and style of the major schools and personalities in archaic, classical, and Hellenistic free-standing and architectural sculpture. One course. *Stanley*

232. Greek Painting. Techniques and style in the various media; emphasis on the problems of chronology, attribution, and iconography of Attic pottery. One course. *Stanley*

235. Roman Architecture.* Significant monuments chosen to exemplify the Roman genius in building in the late Republic and early empire. One course. *Richardson*

236. Roman Painting.* Roman pictorial art with concentration on the wall-painting from Campania. Investigation of techniques, iconography, and the use of pictures in decoration. One course. *Richardson*

253. Greece to the Orientalizing Period.* One course. *Oates*

254. The Age of the Tyrants and the Persian Wars.* One course. *Oates*

255. The Age of Pericles.* One course. *Oates*

256. The Fourth Century through Alexander.* One course. *Oates*

260. The History of Rome to 164 B.C.* One course.

261. The Roman Revolution, 146-30 B.C.* One course. *Oates*

262. Rome under the Julio-Claudians. One course. *Staff*

263. From the Flavian Dynasty to the Severan. One course. *Oates*

270. The Rise of the Hellenistic Kingdoms.* One course. *Oates*

271. The Hellenistic World, 250-31 B.C.* One course. *Oates*

DEPARTMENTAL MAJOR IN GREEK

Prerequisite. Greek 2 or equivalent.

Major Requirements. Six courses in Greek above the level of Greek 2. In addition, students will be required to pass an examination testing proficiency in Greek composition or to complete Greek 117.

Related Work. Greek majors normally take at least four semesters of Latin, and are also encouraged to take course work in ancient history and/or archaeology. The nature and amount of related work, however, may vary with the student.

DEPARTMENTAL MAJOR IN LATIN

Prerequisite. Latin 64 or equivalent.

Major Requirements. Six courses in Latin above the level of Latin 64. In addition, students will be required to pass an examination testing proficiency in Latin composition or to complete Latin 117.

* Not offered in 1972-73.

Related Work. Latin majors normally take at least four semesters of Greek, and are also encouraged to take course work in ancient history and/or archaeology. The nature and amount of related work, however, may vary with the student.

DEPARTMENTAL MAJOR IN CLASSICAL STUDIES (ANCIENT HISTORY AND ARCHAEOLOGY)

Prerequisite. Classical Studies 53-54 or 55-56.

Major Requirements. Eight courses at the 100-level or above, including two courses of seminar or independent study, or a combination of these. Reading knowledge of Latin or Greek to the level of Latin 64 or Greek 64. Two courses in the ancient languages above that level may be counted toward the major.

Majors in either Greek or Latin who contemplate graduate work are reminded of the necessity for competence in both languages for all higher degrees and of the requirement for a reading knowledge of French and German (usually an examination in one of these languages must be passed in the first year of graduate work and an examination in the other the second year).

Majors are eligible for nomination to a term of one semester during their junior year at the Intercollegiate Center for Classical Studies in Rome, of which Duke University is a founding member, at a cost comparable to that of a semester at Duke. Financial arrangements are made through the University, and students may apply for scholarship assistance. Courses in Greek, Latin, ancient history, and archaeology taken at the Center are counted toward the degree requirements of the Department of Classical Studies. For further information, see section on study abroad.

Comparative Literature

The courses in comparative literature may be taken as electives by advanced students; certain courses serve as related work in several departments (see the entries for related work under the separate departments).

No major is now offered in comparative literature. Students interested in the study of the interrelationships of literature as part of their undergraduate program, or as preparation for graduate work, may consult Dr. Salinger.

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year, by permission. Two courses. *Salinger*

193, 194. Independent Study. Directed reading and research. Open only to qualified students in the senior year, by permission. Two courses. *Salinger*

201, 202. Romanticism. Studies in the origin, rise, and development of the Romantic Movement in the chief literatures of the Western world. The approach is comparative; the principal emphasis will be on England, France, and Germany, with some reference to other countries. Selected subjects will occasionally be covered by speakers from various departments of the University. Two courses. *Salinger*

203, 204. Realism and Symbolism. Comparative studies in the literatures of England, France, Germany, Russia, the Scandinavian countries, Spain, and Italy, tracing the decline of romantic individualism and the reappraisal of man's significance against the social background. Selected subjects will occasionally be

covered in lectures by speakers from various departments of the University. Two courses. *Salinger*

205. Foundations of Twentieth-Century European Literature. The roots of the contemporary scene (Proust, Mann, Rilke, Kafka, Lorca, Lagerkvist, Gide, Camus, Hesse) evolving toward a mythology of man. One course. *Salinger*

For a description of the following courses see the departmental listing:

Readings in European Literature. (English 163, 164.) *Clubbe and Strandberg*

Modern European Drama. (English 169.) *Reardon*

Readings in Scandinavian Literature. (English 165.) *Anderson*

Religious Values in Classical and European Literature. (Religion 187.) *Kort*

Recent Literature and its Religious Implications. (Religion 188.) *Kort*

Studies in Indian Literatures. (Hindi-Urdu 171, 172.) *Shonek*

Russian and Polish Romanticism. (Slavic Languages 236.) *Krynski*

Computer Science Program

Professor Gallie, *Director*; Assistant Professor Ramm, *Director of Undergraduate Studies*; Professors Naylor and Woodbury; Associate Professors Patrick and Starmer; Assistant Professor Hammond; Instructor Austin; Adjunct Associate Professor Williams

The Computer Science Program provides courses on the theory of computer design, capabilities, and use. Most courses require the student to make extensive use of one or more of the available computers as a problem-solving instrument.

No major is offered in computer science. Students preparing for graduate studies in computer science are advised to consult with the Director of the Computer Science Program concerning choice of electives from among the courses listed below.

Students who wish to take a single introductory course in computer science, as part of their general education, normally elect Computer Science 51.

Unless a course is listed also as an offering in one of the departments of arts and sciences, it may not be used to satisfy a distributional requirement in Program I.

42. Introduction to Digital Systems. (For description, see Electrical Engineering 42.) One course. *Marinos*

51. Introduction to Digital Computation. Flow charts; an assembly language; program structures, subroutines, data structures, arrays, polynomials; an algorithmic language; numerical linear algebra, matrix inversion, linear programming, and least-squares techniques. (Also listed as Mathematics 51.) One course. *Staff*

150. Computer and Programming. Prerequisite: Computer Science 51. One course. *Staff*

152. Non-Numerical Computation. Data structures: linear lists such as stacks, queues, dequeues, circular lists, and doubly linked lists; trees; multilinked structures; dynamic storage allocation. Exercises will require use of an assembly

language. Prerequisite: Computer Science 150. (Also listed as Mathematics 152.) One course. *Staff*

157. Introduction to Switching Theory. (For description, see Electrical Engineering 157.) One course. *Marinos*

161. Numerical Solution of Ordinary Differential Equations. Basic existence and uniqueness considerations; algorithmic procedures for step by step integration; stability theory and its limitations; accuracy analysis and numerical procedures for determining it; analogue methods and their accuracy and stability characteristics. (Also listed as Mathematics 161.) Prerequisite: Mathematics 74. One course. *Murray*

163. Computational Statistics. Prerequisites: Computer Science 51 and Mathematics 31 or equivalent. One course. *Woodbury*

For Seniors and Graduates

203. Random Signals and Noise. (For description, see Electrical Engineering 203.) One course. *Kerr and Nolte*

205. Signal Detection and Extraction Theory. (For description, see Electrical Engineering 205.) One course. *Nolte*

208. Digital Computer Design. (For description, see Electrical Engineering 208.) One course. *Marinos and Owen*

211, 212. Real-Time Data Acquisition Systems. Hardware and software techniques for data acquisition will be covered. Algorithms will be developed for supporting a multi-programmed system operating in a real-time environment. Two courses. *Starmer*

221, 222. Numerical Analysis. Introduction to numerical analysis, error analysis, interpolation, numerical differentiation and integration, summation, numerical solutions of ordinary differential equations, real and complex roots of equations, solution of simultaneous equations and matrix inversion, calculation of eigenvalues and eigenvectors, numerical solution of partial differential equations, linear programming, and least-squares techniques. A knowledge of computer programming is assumed. (Also listed as Mathematics 221, 222.) Two courses. *Patrick*

231. Operating Systems. A study of the characteristics which are required of an operating system and methods for implementation. Case studies of both small and large existing systems will be made. One course. *Ranm*

232. Metaprograms. Programs which process programs: compilers, interpreters, assemblers. Syntax and semantics of programming languages. One course. *Gallie*

241, 242. Information Organization and Retrieval. This course deals with the structure, analysis, organization, storage, searching, and retrieval of information. Studied in particular will be structure of files, dictionary construction and look-up, search and matching procedures, indexing, file maintenance and methods for user interaction with the automated system. Practical programming experience in such techniques will be included. Prerequisite: Computer Science 51, 152. Two courses. *Hammond*

244. Econometrics II. (For a description, see Economics 244.) One course. *Naylor*

250. Clustering and Classification. Algorithms and operating characteristics of clustering and classification methods. Data models for sequential data acquisition, clustering in terms of nearest neighbor and/or mixtures of distributions (missing information principle). Characterization of patient groups versus normal groups and selection of measures to characterize diseases as super-clusters. Application of Bayes' procedures to classification into clusters and super-clusters. Prerequisite: permission of the instructor. One course. *Woodbury*

265. Advanced Topics in Computer Science. Opportunity for study of advanced problems in computer science, possibly leading to the development of a substantial computer program. One course. *Staff*

Economics

Professor Davies, *Chairman*; Associate Professor Vernon, *Director of Undergraduate Studies*; Professors Blackburn, Bronfenbrenner, de Vyver, Goodwin, Hanna, Kreps, Naylor, Saville, Spengler, and Yohe; Associate Professors Havrilesky and Treml; Assistant Professors Black, Clark, de Marchi, Graham, McElroy, Salkin, and Weintraub

Economics courses aim to develop in the student the critical and analytical skills essential for understanding economic problems and institutions, in both their contemporary and in their historical setting. Although no particular vocational or professional goal is emphasized, these courses provide the academic background necessary for positions in industry, for work in many branches of government service, and for graduate study in economics and the social sciences.

Economics 1 or 51 and 2 or 52 are recommended to all students planning to elect further courses in the department.

Students planning to do graduate work in economics are advised to take as many of the following courses in mathematics (listed in preferential order) as their schedules permit: Mathematics 31, 32, 51, 73, 74, 131, and 135-136.

1. National Income and Public Policy. Basic economic analysis emphasizing current public policy issues. How the level and rate of growth of aggregate national income and output are determined. What causes unemployment, inflation, and international payments problems. How monetary policy (money supply and interest rates) and fiscal policy (government expenditures and taxes) affect these problems. Economic problems of developing countries. (Open only to freshmen.) One course. *Staff*

2. Competition, Monopoly, and Welfare. A continuation of Economics 1. How the composition of the economy's output and the distribution of its income (who is rich and who is poor) are determined in a market economy by supply and demand. How and why markets work or fail to work and the implications for social policies. Role of government in a market economy: topics such as environmental economics, monopoly, unionism, international trade. Comparison of a market economy with other systems of economic organization. (Open only to freshmen and not open to students who have had Management Sciences 50.) One course. *Staff*

- 51. National Income and Public Policy.** Introductory course similar to Economics 1, but at a slightly more advanced level. (For sophomores, juniors, and seniors.) One course. *Staff*
- 52. Competition, Monopoly, and Welfare.** Similar to Economics 2, but at a slightly more advanced level. (For sophomores, juniors, and seniors and not open to students who have had Management Sciences 50.) One course. *Staff*
- 51D, 52D.** The same courses as Economics 51, 52 except taught as lectures with small group discussion sections. Two courses.
- 54. Quantitative Analysis in Economics.** Mathematical techniques of importance in economics. Partial derivatives, Lagrange multiplier methods, matrix theory, and difference and differential equations. Prerequisite: Mathematics 21 or 31. One course. *Staff*
- 100. Capitalism and Socialism.** Selected ideological classics of new and old right and left economics including both "counsels for perfection" (Utopias) and "precepts for action" in political economy. Prerequisites: Economics 51 and 52. One course. *Bronfenbrenner*
- 106. The Economics of Poverty.** Poverty in the United States: its definition, measurement, history, racial dimensions, and present and proposed policies for its amelioration. Prerequisite: Economics 52. One course. *Blackburn and Kreps*
- 108. Economics of War.** Conflict theory, causes and economic consequences of war, military manpower, military-industrial complex, disarmament and the economy. Prerequisite: Economics 52. One course. *Staff*
- 109. Economic Geography of Latin America.** This course involves comprehensive study of the resources and people of Mexico, the West Indies, and Central and South America. Special emphasis is placed upon the possibilities and limitations of increases in trade between the United States and the leading Latin-American countries. One course.
- 114. Economic Geography of Africa.** A continental study of the natural environmental factors of Africa and the basic economic patterns of adjustments and adaptations on regional or national bases. One course. *Tuthill*
- 115. Fundamentals of Geography.** A functional social studies approach to geographic factors and their interrelationships. One course. *Tuthill*
- 116S. Economic Geography of Anglo-America.** Geographic and economic regions of the United States and Canada; their resource base and the major economic activities, their spatial distribution and relative significance. One course. *Tuthill*
- 120. Economic Geography of Asia.** Concepts of agricultural, manufacturing, and distributive location theory, resource evaluation, and regional planning in Asia. One course. *Tuthill*
- 132. Development of the American Economy.** From first settlement to present: quantity of goods and quality of life; employment and leisure; domestic

and foreign commerce; poverty and affluence; money and prices; slavery, agriculture, and ghettos; business and labor; and roles and policies of governments. One course. *Saville*

138. Economic Statistics. Survey of principal concepts and methods; application to economics. (Not open to students who have had Mathematics 133, Management Sciences 60, Psychology 117.) One course. *Hanna*

139. Introduction to Econometrics. Data collection, estimation, and hypothesis testing. Use of econometric models for analysis and policy. Prerequisites: Math 31 and 32, or equivalent, and Economics 138 or Management Sciences 60 or equivalent. One course. *Staff*

149. Microeconomic Theory. Cost and supply considerations in price theory; the demand for factors of production. The allocation of resources is examined in the context of competitive and monopolistic market structures. One course. *Graham and Trembl*

150. Economic Thought since Adam Smith. A course of readings of leading economic writers of the nineteenth and twentieth centuries. One course. *Goodwin*

153. Money and Banking. The lender's side of financial markets. The activities of commercial banks and other financial institutions in supplying loanable funds and the effects of these activities on the money supply and its rate of use, the impact of central bank and Treasury operations on financial markets, and the evolution of the present monetary system and its institutions. One course. *Yohe and Havrilesky*

154. Aggregative Economics. Concepts and measurement of national income and expenditures, employment, and price levels; the theoretical determination of these aggregates; and applications of macroeconomic theory to business cycles and economic growth. One course. *Black and Havrilesky*

155. Labor Problems. An examination of present-day labor problems followed by an intensive study of methods used by employers and workers in meeting those problems. One course. *de Vyver and Kreps*

166S, 167S-168S. Environmental Policy. Three sequential courses, spring, summer (including internship) and fall, respectively. Permission of instructors required. *Havrilesky, Wuenscher, and Staff*

189. Business and Government. Public policies which most directly affect the operation of competition in the business world. The economic basis for and evaluation of antitrust policy, public utility regulation, and public enterprise. Prerequisite: Economics 149 or consent of instructor. One course. *Vernon and Havrilesky*

191, 192. Independent Study. Directed reading and research. Admission will be subject to approval of the individual instructor and the department. Two courses. *Staff*

193, 194. Independent Study. Same as Economics 191, 192 but for seniors. Two courses. *Staff*

195. Man-Computer Policy Games. Experience in playing, administering, and evaluating policy games such as tax policy, managerial decision-making in competitive markets and policy toward family planning. One course. *Naylor*

199. The Changing South. (See Interdisciplinary Course 199.)

201S, 202S. Senior Seminar in Economics. Problems in theory and applied economics. Readings, reports, and discussion of selected topics. For majors in economics, with consent of the department. Two courses. *Staff*

204S. Advanced Money and Banking. Monetary theory and its statistical and institutional implementation. Particular attention is given to the development of aggregative theories of prices, interest rates, and production; the functioning of monetary policy within various theoretical frameworks; and appraisal of the recent use in the limitations of Federal Reserve policy. One course. *Yohe*

211. Introduction to Mathematical Economics. Applications of topics in calculus, differential equations, and linear algebra to the theory of the firm, capital theory, macroeconomics, cycles, growth, and linear economic models. Prerequisites: Economics 149 and 154 and Math 31 and 32, or equivalent. One course. *Staff*

219. Economic Problems of Underdeveloped Areas. Consideration and analysis of the economic and related problems of underdeveloped countries. Some attention will be given to national and international programs designed to accelerate the solution of these problems. One course. *Saville and Spengler*

231. Economic Development of Europe. Sequence of local, national, and international economic structures under situations of changing trade, industry, agriculture, population, investment, war conditions, public ownership, cartels, colonialism, and prices. One course. *Saville*

233. State and Urban Finance. Fiscal problems of state and local government. Expenditures, taxation, and debt; intergovernmental financial relations. Prerequisite: Economics 51-52 or consent of instructor. One course. *Black and Davies*

234. Urban Economics. Economic factors which influence the internal development of metropolitan areas. Urban problems involving slums, ghettos, poverty, and transportation are analyzed from an economic point of view. Prerequisite: Economics 149 or consent of instructor. One course. *Black*

237, 238. Statistical Methods. A study of statistical methods appropriate for dealing with problems in business and social science. In addition to developing more thoroughly the subject considered in Business Statistics, the following methods will be considered: simple, multiple, partial, and curvilinear correlation; curve fitting; probability; sampling distributions; and statistical inference. Prerequisite: Economics 138 or consent of the instructor. Two courses. *Hanna*

243. Econometrics I. Economic theory, mathematics, statistical inference, and electronic computers applied to analysis of economic phenomena. Objective is to give empirical content to economic theory. Matrix algebra used to develop topics in inference, linear regression, and systems of simultaneous equations. Use is made of the electronic computer. One course. *Naylor*

244. Econometrics II. A course on the design of computer simulation experiments for economic systems. Topics include generation of stochastic variates, computer models of queueing and inventory systems, models of the firm and industry, models of the economy, simulation languages, and experimental design. (Also listed as Computer Science 244.) One course. *Naylor*

257. Manpower and Human Resources. Allocation of human resources; returns to investments in education and training; qualitative composition of the labor force. One course. *Kreps*

262. Trade Unionism and Collective Bargaining. An intensive survey of the trade union as an economic institution is followed by a study of the principles and problems of union-management relationship as found in collective bargaining. One course. *de Vyver*

265S. International Trade and Finance. A study of fundamental principles of international economic relations. Subjects covered include the economic basis for international specialization and trade, and the economic gains from trade, the balance of international payments, problems of international finance, investments, and monetary problems. Prerequisite: Economics 149. One course. *Clark*

268S. Competition and Monopoly. A detailed study of the varieties of imperfectly competitive markets, the economic and legal issues which they raise, and the policy solutions which have been attempted in the United States. One course.

287. Public Finance. An analysis of the impact of governmental expenditures, revenues, and debt on the allocation of resources, the redistribution of income, and the stabilization of income. One course. *Black and Davies*

293. Soviet Economic History. Economic policy-making in the USSR in a historical setting. One course. *Trembl*

294. Soviet Economic System. Theoretical problems of resource allocation, economic development, and optimal micro-decision-making in a non-market economy. One course. *Trembl*

DEPARTMENTAL MAJOR

Prerequisites. Mathematics 31, Economics 1 or 51, Economics 2 or 52 (Management Sciences 50 will be accepted in lieu of Economics 2 or 52).

Major Requirements. Any five additional courses in the department. Substitution of courses in other departments for similar courses in the Economics Department will not be permitted, with one exception, which is that Mathematics 133 or Management Sciences 60, if taken prior to spring semester 1971-72, may be substituted for Economics 138, thereby counting toward the five-course requirement.

The department offers work leading to graduation with distinction. See the section on Honors in this *Bulletin*.

Education

Professor Hurlburt, *Chairman*; Associate Professor Sublett, *Director of Undergraduate Studies*; Professors Cartwright, Gehman, Githens, Hopkins, Petty, Shuman, and Weitz; Associate Professors Adams, Ballantyne, Carbone, Colver, Di

Bona, Johnson, Katzenmeyer, Martin, and Pittillo; Assistant Professor Davis; Part-time Instructor Troy

Students who expect to teach in the public schools should plan their courses in accordance with the general regulations set forth under Teaching. Students who intend to teach in elementary schools should consult with Professors Petty or Sublett; those intending to teach in secondary schools should consult with Professors Cartwright, Githens, Johnson, or Shuman. Students should confer with these advisers prior to registration each semester.

Students who do not expect to teach but desire an understanding of the school as part of a liberal education are advised to elect such courses as Education 100 and 113 for their introductory work in the department and then to elect further work in accordance with their special interests.

100. Social and Philosophical Foundations of Education. A study of the basic features, assumptions, viewpoints, and issues of education in contemporary America. This course or Education 113 is required of all who intend to practice teach and of all majors in education, and should be taken in the junior year. One course. *Carbone, Di Bona, Johnson, Martin, and Sublett*

105. Elementary Education: Reading. Must be taken concurrently with Education 106. Half-course. *Adams*

106. Elementary Education: Language Arts. Must be taken concurrently with Education 105. Half-course. *Adams*

107. Elementary Education: Arithmetic. The processes, methods, and materials basic to the teaching of arithmetic in the elementary schools. Required in the elementary-education major. Half-course. *Petty*

108. Elementary Education: Science. The principles, methods, and materials basic to the teaching of the sciences in the elementary school. Required in the elementary-education major. Half-course. *Githens*

113. History of American Education. A study of American education from colonial times to the present. The development of schools, their organizations, administration, curriculum, and methods as seen in relation to the social forces that have produced our particular type of civilization. One course. *Johnson*

118. Educational Psychology. Psychology of learning, individual and social development, and psychology of adjustment as related to problems of instruction and the process of education. Prerequisite: Psychology 92, 93, 94, or 95. One course. *Davis*

151. Public School Music Education. Required in the elementary-education major. (See Music Education 151 for description.) Half-course.

152. Public School Music Literature. Required in the elementary-education major. (See Music Education 152 for description.) Half-course.

153. Vocal Music in the Public School. (See Music Education 153 for description.) One course.

154. Instrumental Music in the Public School. (See Music Education 154 for description.) One course.

161. Integrated Art in the Public School. Work in the materials and methods in basic two-dimensional art media. Half-course. *Stars*

162. Plastic Art in the Public School. Work in basic three-dimensional art; emphasis on ceramics. Half-course. *Stars*

169. Contemporary Issues in Education: Minorities and the Schools. Issues and problems concerning minorities, particularly Blacks, in relation to the school. One course. *Staff (Coordinator, Di Bona)*

195S. Elementary Education: Principles. The nature, subject matter, and organization of elementary education for instruction in the primary and intermediate grades. Must be accompanied by Education 196. Half-course. *Petty and Sublett*

196. Elementary Education: Internship. Full-time observation and teaching for half a semester. Prerequisite: Education 195S, *C* average overall and in the elementary education major; preparation for teaching in the elementary school or consent of the instructor. This course combined with Education 195S will fulfill the seminar and independent study requirement. One and one-half courses. *Petty and Sublett*

201. Teaching and Supervision of Arithmetic. Special attention is given to the number system, the fundamental operations (with whole numbers, fractions, and decimals), percentage, and measurements. Considered also are the meaning theory, methods of teaching, problem-solving, evaluation, practice and drill, and selection and gradation of arithmetical contents. Designed for teachers and supervisors in elementary schools. One course. *Petty*

202. Comparative and International Education: Industrialized Nations. Structure and functioning of educational institutions in selected developed societies. Relevant social science theory and methods emphasized. One course. *Di Bona*

206. Studies in the History of Educational Philosophy. The educational views of leading thinkers in the history of Western philosophy, including Plato, Augustine, Locke, Rousseau, Kant, Whitehead, and Dewey. One course. *Carbone*

207. Social History of Twentieth-Century American Education. Twentieth-century American education in the context of social and intellectual history. One course. *Johnson*

215S. Secondary Education: Principles. Principles, curriculum, and methods in secondary education. Prerequisite: *C* average overall and in teaching field or fields. Must be accompanied by Education 216. Half-course. *Cartwright, Githens, Johnson, and Shuman*

216. Secondary Education: Internship. Supervised internship in junior or senior high school. Full-time observation and teaching for half a semester. Prerequisite: Education 215S, *C* average overall and in the major or teaching field; preparation for a teaching field; or the consent of the instructor. This course com-

bined with Education 215S will fulfill the seminar and independent study requirement. One and one-half courses. *Cartwright, Githens, Johnson, and Shuman*

217. The Psychological Principles of Education. An advanced study of teaching, learning, and the learner. Selected problems guiding the reading of students will be discussed in class. One course. *Davis and Gehman*

218. Comparative and International Education: Developing Societies. Structures and functioning of educational institutions and processes in developing nations. One course. *Di Bona*

219. Comparative and International Education: South Asia. Traditional and modern educational developments in India and Pakistan. One course. *Di Bona*

222. New Developments in Elementary School Curriculum. The open classroom, team teaching, non-graded programs and individualized instruction. Assessment of recent emphasis on early childhood education and the middle school. One course. *Sublett*

225. The Teaching of History and the Social Studies. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. One course *Cartwright*

226. Teaching Reading in the Elementary School. A study of the nature of the reading process and of principles, methods, and materials for the development of effective reading attitudes and skills as applied both to developmental and remedial programs. Practice is provided with elementary-school children suffering reading retardation, in testing, diagnosis, and daily remedial teaching. One course. *Adams*

236. Teaching Reading in the Secondary Schools. A study of the nature of the reading process and of principles, methods, and materials for the development of effective reading attitudes and skills as applied both to developmental and remedial programs. For secondary-school teachers of all subjects who wish to improve the reading and study habits of their students. One course. *Adams*

237. The Teaching of Literature in Secondary Schools. Literature generally taught in secondary schools. Adult and transitional literature are considered. Methods of organizing the program and of teaching literature. One course. *Shuman*

239. The Teaching of Grammar, Composition, Mechanics, and Usage in Secondary School. Recent developments in the teaching of grammar, composition, mechanics, and usage. Students will write and grade compositions. Term project. One course. *Shuman*

241. Principles of Guidance. An historical survey of the philosophies of guidance; a study of the interrelationships between instruction, administration, and guidance in education. Prerequisite: six hours of psychology or educational psychology. One course. *Colver*

246. The Teaching of Mathematics. This course deals with such topics as aims, curriculum, course and lesson planning, and classroom procedure for teaching secondary-school mathematics. One course. *Troy*

253. Law and Education. The elements and problems of educational organization which have come within the purview of constitutional and legislative provisions and appellate court decisions. One course. *Martin*

255. Assessment of Abilities. The selection, use, and interpretation of various instruments for predicting and evaluating the outcome of educational experiences including surveys of standardized tests of aptitude and achievement. One course. *Colver*

256. Classroom Assessment of Student Achievement. The techniques used by classroom teachers to evaluate student progress. Special emphasis will be directed to tests written by teachers. One course. *Colver*

258. Assessment of Personality, Interests, and Attitudes. The rationale construction, use, and interpretation of standardized instruments designed for the assessment of students' interests, attitudes, and personality. Emphasis on counseling applications. Prerequisites: Education 243 and 255 or approval of instructor. One course. *Weitz and Colver*

266. Science in the Elementary School. Presentation of basic concepts in natural and physical science through selected readings, the use of simple experiments and demonstrations, construction and use of equipment, and field studies. One course. *Githens*

276. The Teaching of High-School Science. Discussion, lectures, and collateral reading related to such topics as aims, tests, curriculum, classroom and laboratory procedure, field trips, and course and lesson planning for secondary-school science. One course. *Githens*

DEPARTMENTAL MAJOR

Undergraduate majors in education at Duke University are offered in elementary-school education and science education.

The Department offers work leading to graduation with distinction. See the section on Honors in this *Bulletin*.

Majors in Elementary Education and Science Education. Students desiring to teach in elementary schools or science in secondary schools should read the descriptions of these programs of study listed under the proper headings elsewhere in this *Bulletin*.

Materials and Methods Courses. Certain courses concerned with materials and methods in teaching the various subjects in the public school curriculum are listed in the proper subject matter department. These courses are intended to give credit for teaching certificates and are recommended by the Department of Education for such credit.

STUDENT TEACHING

During the eight weeks of student teaching, students should plan to live in a community which is some distance from Durham. This will entail some additional living expense to be borne by the student teacher. Room rent refund is not made.

English

Professor Ferguson, *Chairman*; Professor Williams, *Director of Undergraduate* Randall, Reiss, Sanders, Smith, Stevenson, and Turner; Associate Professors *Studies*; Associate Professor Gerber, *Supervisor of Freshman Instruction*; Professors Anderson, Bevington, Bowman, Budd, Duffey, Lievsay, Nygard, Patton, Clubbe, Harwell, Jackson, Jones, Krueger, Mellown, Michalak, Monsman, Price, Reardon, Strandberg, and Wetherby; Assistant Professors Adams, Butters, Clum, DeNeef, and Schwerman; Visiting Assistant Professor Applewhite; Lecturer Vick

WRITING AND LANGUAGE

1. Freshman Composition. Weekly expository themes based on British and American prose fiction and non-fiction; one general lecture, one section meeting, and one individual conference each week. One course. *Staff*

65, 66. Imaginative Writing. A foundation course in imaginative writing, both prose and verse. Primarily for sophomores, but in special cases open to other students. Consent of instructor required. Two courses. *Monsman*

101. Advanced Expository Writing. Designed for students interested in expository writing, this is a course in advanced composition. It includes also business letters and reports. Primarily for juniors and seniors; open also to sophomores approved by the instructor. One course. *Harwell*

103, 104. Creative Writing. Class discussion of students' manuscripts and individual conferences with the instructor. Open to sophomores, juniors, and seniors. Students desiring admission to either course should present a piece of writing to the instructor as early as possible in the preceding semester. Two courses. *Bevington and Price*

107. Introduction to Linguistics. Origin and nature of language; methods of descriptive linguistics with reference to historical and comparative linguistics. Prerequisite: sophomore standing. One course. *Butters*

108. Development of the English Language. An elementary historical study of the English language: patterns of change and growth, with some attention to methods of philological inquiry and the relations of philology to literary studies. One course. *Bowman*

109. Modern English Grammar. A descriptive study of written and spoken American English of the present time, with attention to standards of usage and pronunciation and the relations of grammar to composition. One course. *Butters*

ENGLISH AND AMERICAN LITERATURE

Introduction to Literature. One course each; English 26 may be taken twice. 20. (Not a course. This number represents one course credit for advanced placement.)

21S. Studies in the Novel.

22S. Studies in Drama.

23S. Studies in Drama and Poetry.

24S. Studies in Poetry.

25S. Studies in Epic.

26. Studies in Special Topics. (Many of the sections of this course are taught as seminars; the Schedule of Courses should be consulted.)

55, 56. Representative British Writers. Usually these works are studied in the first semester: Chaucer's Prologue to *The Canterbury Tales* and at least two tales, Shakespeare's *I Henry IV*, *Hamlet* or *King Lear*, and one other play, John Donne's poetry (selections), Milton's *Paradise Lost* (selections) and some of the shorter poems; in the second semester: novels by Fielding (*Joseph Andrews*) and Dickens (*Great Expectations*), and selections from the poetry of Pope, Wordsworth, Keats, and Yeats. Two courses. *Staff*

57, 58. Representative American Writers. Selections and complete works. The first semester includes Poe, Emerson or Thoreau, Hawthorne, Melville, Whitman, Dickinson, and Twain; the second semester includes James, Frost or Robinson, Crane or Dreiser, O'Neill, Faulkner, Hemingway, and others. Open to juniors and seniors with the permission of the Director of Undergraduate Studies. Prospective majors should take courses numbered 173 through 176 instead of this course. Two courses. *Staff*

112. English Literature of the Middle Ages. A study of the principal forms and examples of English prose, poetry, and drama of the Anglo-Saxon and Middle English periods (excluding Chaucer), read in translation. One course. *Reiss*

115. Chaucer. *The Canterbury Tales* and the minor poems, with attention to their literary and social background. One course. *Adams, Nygard, and Reiss*

121. English Literature of the Sixteenth Century. Emphasis in poetry on Wyatt, Sidney, Spenser, Raleigh, Shakespeare; in prose on Sidney and Florio's Montaigne; in drama on Marlowe. One course. *DeNeef and Krueger*

123, 124. Shakespeare. In the first semester twelve plays, before 1600; in the second semester about ten plays, after 1600. Two courses. *Bowman, Krueger, Randall, and Williams*

125. English Literature of the Early Seventeenth Century. Emphasis in poetry on Jonson and the cavaliers, Donne and the metaphysicals; in drama on Jonson, Tourneur, Webster, Ford; in prose on character writers, Bacon, Burton, Donne, Browne. One course. *DeNeef and Krueger*

126. English Literature of the Late Seventeenth Century. Emphasis in poetry on later metaphysicals, Cowley, Denham, Waller, Dryden; in prose on Taylor, Dryden, Hobbes, Locke; in drama on Dryden, Congreve, Etherege, Wycherly. One course. *DeNeef*

127. Milton. Milton's poetry and prose, their relation to the period and to other great works of literature. One course. *Lievsay and Price*

131, 132. Eighteenth-Century Literature. The writers emphasized in the first semester are Pope, Swift, Defoe, Addison, Steele, and Fielding; in the second semester, Johnson, Gray, Boswell, Goldsmith, Sheridan, Blake, and later novelists. Two courses. *Ferguson and Jackson*

138. The English Novel From the Beginnings to 1800. Some of the writers studied are Nashe, Deloney, Lyly, Sidney, Bunyan, Behn, Defoe, Richardson, Fielding, Smollett, and Sterne. One course. *Jackson*

141, 142. English Literature of the Early Nineteenth Century. The course begins with the forerunners of Romanticism. The chief emphasis in the first semester is on the work of the older Romantics: Wordsworth, Coleridge, Lamb, and Hazlitt. In the second semester the chief emphasis is on the work of the younger Romantics: Byron, Shelley, Keats, and DeQuincey. Two courses. *Clubbe, Patton, and Stevenson*

145, 146. English Literature, 1832-1900. A study of the major writers of poetry and prose from Macaulay to Hardy. In the first semester, Macaulay, Tennyson, Carlyle, the Brownings, Newman, Mill, Clough, and FitzGerald; in the second semester, Arnold, the Rossettis, Ruskin, Patmore, Meredith, Huxley, Morris, Swinburne, Pater, and Hardy. Collateral reading from novels of the period. Two courses. *Harwell, Monsman, and Sanders*

148. The English Novel in the Nineteenth Century. Some of the writers studied are Scott, Austen, Dickens, Thackeray, Trollope, the Brontes, George Eliot, Meredith, Butler, and Hardy. One course. *Harwell, Monsman, and Stevenson*

151. English Literature of the Early Twentieth Century. Principal writers of fiction, drama, and poetry, including Conrad, Shaw, Yeats, Kipling, Wells, Ford, Forster, Joyce, O'Casey, and Lawrence. Also transitional and minor figures. One course. *Bevington, Mellown, and Smith*

153, 154. Twentieth-Century Poetry. A study of twentieth-century poetry and criticism of poetry in England and America. Problems in critical analysis and interpretation. First semester: the emphasis is on sources in nineteenth-century Symbolism and on the poetry of Hopkins, Yeats, Eliot, Pound, and Stevens. Second semester: the emphasis is on the poets and the poetic theories of the last thirty years. Two courses. *Bevington, Mellown, and Smith*

158. The English Novel in the Twentieth Century. Some of the writers studied are Conrad, Lawrence, Forster, Joyce, Woolf, Huxley, Cary, Amis, and Golding. One course. *Mellown and Smith*

159. Modern British Drama. English and Irish drama from the late nineteenth century to the present. One course. *Reardon*

173. American Literature to 1800. Colonial authors, Bradford, Taylor, Cotton Mather, Edwards, Byrd, and Franklin, and authors of the early Republic such as Tyler, Freneau, and C. B. Brown. One course. *Staff*

174. American Literature from 1800 to 1860. Prose and poetry of American Romanticism: Emerson, Thoreau, Hawthorne, Poe, Melville, and Whitman. (Not open to students who have taken the old 137.) One course. *Staff*

175. American Literature from 1860 to 1915. Dickinson, Twain, James, the social and philosophical essayists, Crane, Dreiser, Robinson, and Frost. (Not open to students who have taken the old 138.) One course. *Staff*

176. American Literature since 1915. Poetry, fiction, drama, and critical prose from Stein, Anderson, O'Neill, Hemingway, and Faulkner to such contemporary authors as Malamud and R. Lowell. (Not open to students who have taken the old 138.) One course. *Staff*

177, 178. American Fiction. A survey of the novel and the short story. The first semester covers the nineteenth century from Washington Irving to Stephen Crane; the second semester covers the twentieth century through ten representative books. Two courses. *Anderson, Budd, and Clum*

179. American Drama. Representative plays from Colonial times to the present: an historical survey. One course. *Reardon*

Conference Courses. Seminars primarily for majors, with priority given to seniors. Emphasis on literary theory and critical writing, with intensive study of one or more authors. One course each; each course may be taken twice.

180S. Conference on Criticism.

181S. Conference on Drama.

182S. Conference on Poetry.

183S. Conference on Fiction.

184S. Conference on Prose Non-Fiction or a Special Topic.

190. Oral Interpretation of Literature. See description under Speech and Theater.

191, 192, 193, 194. Independent Study. Directed reading and research. Students should consult the Director of Undergraduate Studies as early as possible in the semester preceding enrollment. One course each.

197T, 198T. Distinction in English. Tutorials in the reading and criticism of selected British and American writers. Three essays the first term; three essays or an extended paper the second term. Upon recommendation of the tutors and completion of other requirements, the student may graduate with distinction in English. Admission by invitation of the department; students expecting to graduate early may take these courses in reverse sequence, beginning in the spring term preceding their graduation. Two courses. *Anderson, Jones, Krueger, and Mellow*

FOREIGN LITERATURES (IN TRANSLATION)

163, 164. Readings in European Literature. European literature in translation related to similar works in English. The first semester includes works by Rabelais, Cervantes, Voltaire, Goethe, and others. The second semester includes works by Balzac, Dostoevsky, Ibsen, Kafka, Sartre, Camus, and others. Two courses. *Clubbe and Strandberg*

165. Readings in Scandinavian Literature. A study of selections in translation from Ibsen, Strindberg, Lagerkvist, and others; their place in the literary tradition of Scandinavia and their relationships with English and American literature. One course. *Anderson*

169. Modern European Drama. Ibsen to the present; the free theatre movement and the drama of ideas. One course. *Reardon*

SPEECH AND THEATER

50. Essentials of Public Speaking. A basic course in public speaking, designed to give the student the poise and confidence necessary to think and speak freely before an audience. Particular attention is paid to the gathering and organization of speech materials and to oral presentation. Not open ordinarily to juniors and seniors. One course. *Michalak, Reardon, and Schwerman*

100. English for Foreign Students. Designed to assist the student to whom English is a second language to perfect his speaking and understanding of the language. Drills in writing, speaking, listening, and the American idiom. Open to all students and their wives, and to any persons and spouses with an official connection with the University. Those who do not pay full-time student fees may register for a fee of \$5.00. No credit. *Wetherby*

110. Essentials of Public Speaking. A basic course in public speaking for juniors and seniors dealing with the same matters as 50. (Not open for credit to students who have taken 50.) One course. *Michalak and Schwerman*

119. History of the Theater. The origin and development of drama, acting, and stagecraft from ancient Greece to the modern European and American theater. Production problems of representative plays of the various periods will be discussed. Primarily for juniors and seniors; open also to sophomores approved by the instructor. One course. *Michalak*

120. Stagecraft. An introductory course on the technical aspects of play production: scenery, lighting, properties, make-up, and costuming. Laboratory work will be coordinated with the various productions of the Duke Players. Primarily for juniors and seniors; open also to sophomores approved by the instructor. One course. *Michalak*

130. Play Production. An introduction to the methods of producing a play—theater organization, play selection, casting, and rehearsal. Lectures and laboratory. Primarily for juniors and seniors; open also to sophomores approved by the instructor. One course. *Michalak*

139. The Speaking Voice. A study of the mechanisms of speech. Emphasis is placed on providing the skills necessary for the improvement of voice, pronunciation, and diction. Methods of correcting minor functional speech disorders will also be studied. One course. *Schwerman and Wetherby*

140S. Argumentation. The principles of argumentation and debating. The techniques of analysis, investigation, evidence, reasoning, brief making, and refutation. Participation in class discussions and debates. One course. *Wetherby*

150. Persuasive Speaking. The psychological and sociological techniques used in gaining acceptance of ideas through speech. Study is made of the factors influencing human behavior; audience analysis and motivation; choice, arrangement, and adaptation of material. Extensive practice in persuasive speaking. One course. *Wetherby*

160, 170. Broadcasting. A study of the background of radio and television broadcasting. The first semester covers the development of broadcasting as

an industry and as a literary form. The second semester studies the legal and social aspects, and various program forms. Two courses. *Wetherby*

190. Oral Interpretation of Literature. A study of poetry and certain types of prose, with practice in the technique by which they may be communicated to an audience. For juniors and seniors; open also to sophomores approved by the instructor. One course. *Schwerman*

GRADUATE COURSES OPEN TO SENIORS

207, 208. History of the English Language. Old to Modern English; developments in phonology, morphology, syntax, and vocabulary. First semester, Old English; second semester, 1100 to the present. Two courses. *Nygard and Reiss*

209. Present-Day English. A description of present-day American English from the point of view of modern linguistic theory; comparison of traditional and structural grammars; semantic change; the relation of the written to the spoken language; usage. One course. *Nygard and Reiss*

210. Old English Literary Tradition. Poetry: heroic tradition (aside from *Beowulf*), the elegiac tradition, and the Caedmonian and Cynewulfian schools. Prose: Alfred, AElfric, and Wulfstan. Prerequisite: English 207. One course. *Nygard and Reiss*

212. Middle English Literary Tradition. From 1100 to 1500 (excluding Chaucer); medieval genres; reading of selected texts. A reading knowledge of Old or Middle English is recommended. One course. *Nygard and Reiss*

215. Chaucer. *The Canterbury Tales*. One course. *Nygard and Reiss*

216. Chaucer. *Troilus and Criseyde* and the minor poems. One course. *Nygard and Reiss*

221. English Prose of the Sixteenth Century. Readings in the major forms and authors. One course. *Lievsey*

222. English Non-Dramatic Poetry of the Sixteenth Century. Extensive select readings from representative types and authors, excluding Spenser. One course. *Lievsey*

223. Spenser. The reading of Spenser's works, with chief attention to *The Faerie Queene*. One course. *Lievsey*

224. Shakespeare. The plays. One course. *Williams*

225, 226. Tudor and Stuart Drama, 1500-1642. First semester: Peele, Lyly, Greene, Kyd, Dekker, Heywood, Chapman, and Marston, with emphasis on Marlowe. Second semester: Jonson, Webster, Beaumont, Fletcher, Massinger, Middleton, Ford, and Shirley. Two courses. *Randall*

229, 230. English Literature in the Seventeenth Century. Major works in prose, poetry, and drama from 1600 to the death of Dryden. Two courses. *Jackson, Lievsey, Randall, and Williams*

232. Milton. Milton's poetry and prose, with emphasis on the major poems. One course. *Lievsay*

234. English Drama, 1642-1800. The heroic play and the comedy of manners of the Restoration; the important plays, serious and comic, of the eighteenth century. One course.

235, 236. The Eighteenth Century. Swift, Pope, Defoe, Addison, Steele, and others are studied in the first semester; in the second, Gray, Johnson, Boswell, Collins, Goldsmith, the novelists, and other writers. Two courses. *Ferguson and Jackson*

241, 242. English Literature of the Early Nineteenth Century. The Romantic poets and prose writers: first semester, 1790-1810, with emphasis on Wordsworth, Coleridge, and Scott; second semester, 1810-1830, with emphasis on Byron, Shelley, and Keats. Two courses. *Patton, Sanders, and Stevenson*

245, 246. English Literature of the Later Nineteenth Century. The first semester is devoted chiefly to Carlyle, Dickens, Thackeray, Tennyson, and Browning; the second semester to Arnold, Ruskin, Pater, George Eliot, Meredith, the Pre-Raphaelites, and Swinburne. Two courses. *Sanders and Stevenson*

251, 252. English Literature of the Twentieth Century. Representative work of leading writers from 1900 to 1950, in fiction, drama, and poetry. The first semester will include Shaw, Conrad, Yeats, Wells, Bennett, Galsworthy, Ford, Synge, Forster, and Lawrence; the second semester, Joyce, Woolf, Edith Sitwell, Eliot, Huxley, Graves, Bowen, Auden, and Dylan Thomas. Critical analysis of selected texts, with discussion of techniques and ideas. Two courses. *Mellown and Smith*

263, 264. American Literature, 1800-1865. The writers emphasized in the first semester are Emerson, Thoreau, and Hawthorne; in the second semester, Poe and Melville. Two courses. *Budd, Jones, and Turner*

267, 268. American Literature, 1865-1920. Selected works of representative authors of the period. The first semester will include Whitman, Lanier, Mark Twain, James, Howells, Emily Dickinson, Henry Adams, and the Local Colorists; the second semester, Crane, Norris, Moody, London, Dreiser, Edith Wharton, Willa Cather, O'Neill, Robinson, and Frost. Two courses. *Budd*

270, 271. Southern Literature. The principal authors and the chief literary developments from the beginnings to the present. Emphasis in the first semester is on Byrd, Kennedy, Simms, Poe, Timrod, and the humorists; in the second, on Lanier, Harris, Cable, Mark Twain, Ellen Glasgow, and Faulkner. Attention is given to the historical and cultural background and to literary relations extending outside the region. Two courses. *Turner*

275, 276. American Literature Since 1920. First semester, selected fiction from Gertrude Stein to the present. Second semester, poetry from the Imagist movement to the present. Two courses. *Duffey and Strandberg*

277. Major Developments in Contemporary American Poetry. The principal contributions to modern poetry made by American poets, including imagism

and the new poetry; Eliot, Stevens, Hart Crane, the "Fugitives," and a selection from the poets of the present generation. One course.

280. Introduction to Folklore. A survey of the materials of popular tradition, the folksong, the folktale, the proverb, the riddle, and other forms; the methods of folklore investigation; and the relation of these popular genres to literary tradition. One course. *Nygard*

285. Literary Criticism. Readings from the major critics, Plato to the eighteenth century, with emphasis on formative ideas and historical continuity. One course. *Lievsay*

287. Recent Critical Thought. Questions of the nature and value of literature as reflected in recent criticism, theoretical and practical. One course. *Duffey*

289. Literary Biography. Selected works from Plutarch to Strachey with discussion of the historical development of biography, the various methods it has used, and the various theories which have been held about it. One course. *Sanders*

DEPARTMENTAL MAJOR

Basic Requirement. English 55-56.

Major Requirements. Six courses above the sophomore level including one course in one of the major authors: Chaucer, Shakespeare, Milton; two courses in one of the two-semester historical surveys of British or American Literature; two courses in areas not represented by the historical survey chosen (one in each area)—(a) British Literature before 1800, (b), British Literature after 1800, and (c) American Literature; and one additional course given in the English Department (in writing, speech, drama, literature, or language).

The Department offers work leading to graduation with distinction. See the section on Honors in this *Bulletin*.

Forestry

Students without a bachelor's degree who are preparing for work in forestry as a profession should take the courses outlined under the Academic-Forestry Combination outlined in the section on the degree programs for the arts and sciences. However, with the consent of the instructor in charge, certain forestry courses may be elected by students in other curricula provided they have had adequate preparation (see *Bulletin of the School of Forestry*).

Members of the sophomore, junior, and senior classes, whether or not registered in the Forestry-Combination Program, may elect the following course:

152. Conserving Natural Resources. Fundamentals of natural resource development, use, management, and protection based on principles of the natural and social sciences. One course. *Staff*

French

For courses offered in French, see *Romance Languages*.

Geography

For courses offered in Geography, see *Economics*.

Genetics—The University Program

Professor Gross, *Director* (Biochemistry); Professors Amos (Microbiology and Immunology); Buettner-Janusch (Anatomy and Zoology) and Guild (Biochemistry); Associate Professors Gillham (Zoology), C. Ward (Zoology), and Webster (Biochemistry); Assistant Professors Antonovics (Botany), Boynton (Botany), Hall (Biochemistry), Harriman (Biochemistry), Kelley (Biochemistry and Medicine), Kredich (Biochemistry and Medicine), Luftig (Microbiology and Immunology), and F. Ward (Microbiology and Immunology)

For a description of the following courses consult the listings under the specified departments.

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Students interested in preparation for advanced work in genetics or wishing to take an interdisciplinary major in this area should consult with Dr. Ward (032 Biological Sciences Building). Information concerning interdisciplinary programs involving biology may be found on page 28 of this *Bulletin*.

71. Heredity and Society. (Listed as Zoology 71.) One course. *Ward*

180. Principles of Genetics. (Listed as Botany 180, Botany 280, Zoology 180, and Zoology 280.) One course. *Antonovics, Boynton, and Gillham*

186. Evolution. (Listed as Botany 186, Zoology 186, and Zoology 286.) One course. *Antonovics and Lundberg (Zoology)*

For Seniors and Graduates

204. Introductory Genetics. (Listed as Biochemistry 204.) One course. *Gross and Staff*

215. Bacteriophage: Structure and Function. (Listed as Microbiology and Immunology 215.) Half-course. *Luftig and Nichols*

216. Molecular Genetics. (Listed as Biochemistry 216.) One course. *Guild and Staff*

236. Human Genetics. (Listed as Anatomy 236, Anthropology 236, and Zoology 236.) One course. *Buettner-Janusch*

280. Principles of Genetics. (Listed as Botany 280 and Zoology 280.) One course. *Antonovics, Boynton, and Gillham*

282. Experimental Genetics. (Listed as Biochemistry 282.) Half-course. *Hall, Harriman, and Staff*

283. Developmental and Cellular Genetics. (Listed as Botany 283 and Zoology 283.)

284. Current Topics in Genetic Mechanisms. (Listed as Biochemistry 284.) Half-course. *Hall and Staff*

285. Population Genetics and Evolution. (Listed as Botany 285 in the *Graduate Bulletin*.) One course. *Antonovics and Staff*

286. Evolution. (Listed as Botany 186, Zoology 186, and Zoology 286.) One course. *Antonovics and Lundberg (Zoology)*

288. The Cell in Development and Heredity. (Listed as Anatomy 288 and Zoology 288.) Half-course. *Counce, Gillham, and Staff*

Independent Study and *Special Problems* are offered in the Department of Botany under 191, 192, 193, 194, 225, and 226, and in the Department of Zoology under numbers 191 and 192. A student should obtain the permission of both the instructor with whom he wishes to work and the appropriate director of undergraduate studies before registering for these courses.

Geology

Professor Heron *Chairman*; Associate Professor Furbish, *Director of Undergraduate Studies*; Associate Professors Perkins, Pilkey, and Lynts; Adjunct Assistant Professor MacIntyre; Visiting Assistant Professor Mantuani

1. Geological Environments and Man. Physical and chemical environments acting on the earth with special emphasis on their interaction with man. Three lectures and one two-hour laboratory. One course. *Heron and Perkins*

1P. Preceptorial. Field trips. Four hours once a month on Saturday. Elective for students enrolled in Geology 1. *Staff*

2. History of the Earth. Including the physical development and the geological evolution of life. Three one-hour lectures and one two-hour laboratory. Prerequisite: Geology 1 or consent of instructor. One course. *Heron and Lynts*

2P. Preceptorial. A weekend field trip to the classic Paleozoic section in the Appalachians of Virginia and West Virginia in early April, and a one day field trip through the Durham and Deep River Triassic River Basins in late April. Elective for students enrolled in Geology 2. *Staff*

53. Introductory Oceanography. Basic principles of physical, chemical, biological, and geological oceanography. Prerequisite: one year laboratory science or concurrent enrollment in a laboratory science. (Also listed as Botany 53.) One course. *Staff*

63. Geology and Human Ecology. Emphasis is on the effects of accelerated industrial and population growth on society's total resource needs and their environmental consequences. One course. *Mantuani*

101. Crystallographic Mineralogy. Definition of the crystalline state, lattice and group concepts, indices, crystal systems, classification, and crystal morphology. Lectures and laboratory. One course. *Furbish*

102. Fundamentals of Mineralogy. Crystal chemistry, crystal physics, mineral identification, and genesis. Lectures or recitations, laboratory, and field trips. Prerequisite: Chemistry 2 (may be taken concurrently) and Geology 101. One course. *Furbish*

106. Igneous and Metamorphic Rocks. Silicate mineralogy, theory of origin and classification of igneous and metamorphic rocks and rock identification. Lectures and laboratory. Prerequisite: Geology 102. One course. *Furbish*

108. Sedimentary Rocks. Authigenic and detrital minerals, theory of origin and classification of sedimentary rocks and rock identification. Lecture, laboratory, and field trips. Prerequisite: Geology 1. One course. *Heron*

164. Introduction to Geologic Field Methods. Principles and techniques used in geologic mapping and field studies including applicable methods of surveying and the use of aerial photographs. Lectures, laboratory, and field trips. Prerequisites: Geology 1 and 2. One course. *Furbish*

169. The Marine Environment. For description see Marine Sciences.

171. Marine Sciences Seminar. For description see Marine Sciences.

191, 192. Independent Study. Directed reading and research. Open only to highly qualified juniors and seniors, by permission of the Director of Undergraduate Studies. Two courses. *Staff*

For Advanced Undergraduates and Graduates

205. Geological Oceanography. The study of the broad geologic aspects of the ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary processes. Observations in the field will be emphasized and will include training in sampling procedures for both shallow and deep water. Not open to students who have completed Geology 206. (Given at Beaufort only.) Two courses. *Pilkey*

206S. Principles of Geological Oceanography. A survey of geological aspects of the oceans including sediment types, processes of sedimentation, geologic structures of the ocean basins, and bottom physiography. Prerequisite: Geology 108 or consent of instructor. One course. *Pilkey*

208. Shallow-Marine Geology. Physical and biological processes responsible for sediment production, accumulation, and alteration in the shallow-marine environment. Prerequisite: Geology 108 or consent of instructor. Given biennially. One course. *Perkins*

211S. Stratigraphic Principles and Application. Prerequisite: Geology 108. One course.. *Perkins*

212. Environmental Stratigraphy. Application of modern sedimentological models to the environmental interpretation of ancient sedimentary sequences. Prerequisite: Geology 211. Given biennially. One course. *Perkins*

213. Sedimentology. Parameters of sedimentation, sediment classification, and laboratory methods of analysis. Prerequisites: Geology 108 or consent of instructor. One course. *Pilkey*

214S. Sediments in Thin Section. Study of sediments and sedimentary rocks using the petrographic microscope and related techniques. Prerequisite: Geology 213 or consent of instructor. One course. *Perkins*

222. Sedimentary Minerals. Structure and geologic occurrences of selective detrital and authigenic minerals including the clay minerals. Theory and use of

X-ray diffraction, differential thermal analysis, and thermal gravimetric analysis. Prerequisite: Geology 102 or consent of instructor. One course. *Heron*

226. Sedimentary Geochemistry. Principles controlling geochemical processes in sediments from ancient to recent. One course. *Mantuani*

229. Economic Geology. Principles and processes involved when elements are concentrated to economic proportions in magmatic, metamorphic, hydrothermal, sedimentary, or surface environments. Prerequisite: Geology 102. Given on demand. One course. *Furbish*

230. Principles of Structural Geology. Description, origin, and interpretation of primary and secondary geologic rock structures. Prerequisites: Geology 106 and 108. Given biennially. One course. *Furbish*

241-242. Invertebrate Paleontology. Biologic and stratigraphic relationships of fossil invertebrates, with special emphasis on evolutionary trends of invertebrates as interpreted from fossil evidence. Lectures and laboratory. Prerequisites: Geology 1, 2, or consent of instructor. Given biennially. Two courses. *Lynts*

243-244. Micropaleontology. Microscopic animal and plant fossils, exclusive of spores and pollen, with special emphasis on their biology, taxonomy, evolution, and stratigraphic distribution. Lectures and laboratory. Prerequisites: Geology 241-242, or consent of instructor. Given biennially. Two courses. *Lynts*

247. Paleocology. Application of ecologic and geologic principles to the reconstruction of the interrelationship between organisms and their environment in geologic time. Prerequisites: Geology 213, 242, or consent of instructor. Given biennially. One course. *Lynts*

DEPARTMENTAL MAJOR

The A. B. degree

The Department of Geology offers two programs:

1. Geology

Prerequisites. Geology 1 and 2, Chemistry 1 and 2 (or 42), and Mathematics 31 and 32.

Major Requirements. A minimum of eight geology courses above the introductory levels, including 101, 102, 106, 108, 164, 211, and 230.

2. Geology: Preparatory to Advanced Studies in Oceanography

Prerequisites. Geology 1, 2, and 53 (or 206), Chemistry 1 and 2 (or 42), Physics 1 and 2 (or 41), Biology 11 and 12 or Biology 14, calculus and three courses of science electives.

Major Requirements. A minimum of six geology courses above introductory, including 101, 102, 106, 108, 211, and 230.

The B.S. degree

Prerequisites. Geology 1 and 2, Chemistry 1 and 2 (or 42), Mathematics 31, 32, and 51.

Major Requirements. A minimum of ten courses, above introductory level, including 101, 102, 106, 108, 211, 230, plus a field course normally taken during the summer of the junior year.

Germanic Languages and Literature

Professor Phelps, *Chairman*; Assistant Professor Novak, *Director of Undergraduate Studies*; Assistant Professor Bessent, *Supervisor of Freshmen Instruction*; Professor Salinger; Associate Professor Borchardt; Assistant Professors Alt and Stern; Instructors Greenberg, Hartwig, Klables, Snyder, Von Ramm, and Ypma

1-2. Elementary German. Practice in understanding, speaking, reading, and writing. Classroom techniques are combined with those of the language laboratory. Two courses. *Bessent and Staff*

63-64. Intermediate German. Prerequisite: German 1-2 or equivalent. Two courses. *Stern and Staff*

German 63-64 or equivalent is prerequisite for 91, 92, and all 100-level courses.

91, 92. Introduction to German Literature. Readings from representative German authors. Two courses. *Staff*

91P, 92P. Preceptorial. Elective preceptorial for students enrolled in German 91, 92. *Staff*

105. Composition. Syntax with practice in the elements of German expository prose style, restricted to majors. Half-course. *Staff*

109, 110. German Prose Fiction. Origin and development of the German novel and short story with special emphasis on the nineteenth century. Two courses. *Alt*

109P, 110P. Preceptorial. Elective preceptorial for students enrolled in German 109, 110. *Staff*

115, 116. German Drama of the Nineteenth Century. A study of leading dramatists from Kleist to Hauptmann. Two courses.

117, 118. German Conversation. A course primarily in speaking German with some practice in writing, restricted to German majors and other students by permission of the department. Two courses. *Bessent*

119, 120. Survey of German Literature. German literature and its cultural background. First semester: from the beginnings to the Romantic period. Second semester: from Romanticism to the present. Lectures, reports, and reading. Two courses. *Novak, Alt, and Borchardt*

125, 126. Modern German Literature. A study of representative works of the twentieth century. Two courses. *Novak*

125P, 126P. Preceptorial. Elective preceptorial for students enrolled in German 125, 126. *Staff*

131, 132. Introduction to the Age of Goethe. Selected works of Lessing, Goethe, and Schiller. Two courses. *Phelps and Salinger*

133, 134. The German Lyric. A survey of the development of German lyric poetry, principally from Klopstock to Rilke (with some attention to mediaeval and modern poets), seen as poetic reflection of German thought. Two courses. *Salinger*

133P, 134P. Interpretation of German Poems. By written permission of instructor only. Preceptorial for 133, 134. *Salinger*

171, 172. German Literature in English Translation. The great epochs in German literature studied through English translations of representative masterpieces. Two courses. *Borchardt*

181, 182. German. An intensive introduction to the language open only to students who have achieved proficiency in another language. Two courses. *Novak*

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year, by permission of the department. Two courses. *Alt, Borchardt, Novak, Phelps, Salinger, and Stern*

193, 194. Independent Study. Directed reading and research. Open only to qualified students in the senior year, by permission of the department. Two courses. *Alt, Borchardt, Novak, Phelps, Salinger, and Stern*

201S, 202S. Goethe. A study of his life and works, in the light of his lasting significance to Germany and world literature. First semester: lyrics, prose, fiction, and selected dramas; second semester: *Faust I & II*. Two courses. *Phelps*

203S, 204S. Eighteenth Century. Eighteenth-century German literature in its relation to European intellectual currents of that time. Two courses. *Phelps*

205, 206. Middle High German. The language and literature of Germany's first classical period. Two courses. *Stern*

207S, 208S. German Romanticism. The principal writers of the period from 1800 to 1850. Two courses

209S, 210S. Kleist, Grillparzer, and Hebbel. The development of the drama in Germany and Austria between Schiller and Naturalism. Two courses. *Alt and Salinger*

211S, 212S. Nineteenth-Century Literature. From the end of Romanticism through Realism. Two courses. *Alt*

213S. Heinrich Heine. A study of the poet and his impact on his age. One course. *Salinger*

214S. The Twentieth Century. Literature of the twentieth century presented through representative authors. One course.

215S. Seventeenth-Century Literature. A study of the leading writers of the Baroque, viewed against the background of their time. One course. *Borchardt*

216. History of the German Language. The development of the phonology, morphology, and syntax of German from earliest beginnings to the present. One course. *Stern*.

217S. Renaissance and Reformation Literature. The period from 1400 to about 1600. One course. *Borchardt*

218S. The Teaching of German. A survey of modern teaching techniques: problems in the teaching of German on the secondary and college levels. Analysis and evaluation of textbooks and related audiovisual materials. One course. *Phelps*

219. Applied Linguistics. Phonology, morphology, and syntax of German. Introduction to the systematic study of the vocabulary of modern German. By permission of instructor. One course. *Stern*

230. German Cultural History. A study of the background of German civilization and culture (Kulturkunde) from earliest time down to the most recent. One course.

DUTCH

181, 182. Dutch. Intensive introduction to the language of the Netherlands. Modern readings. Completion of second year college level (or equivalent) of another foreign language will normally be required. Two courses. *Stern*

191, 192. Independent Study. Directed reading and research for qualified juniors by permission of the department. Two courses. *Stern*

193, 194. Independent Study. Directed reading and research for qualified seniors by permission of the department. Two courses. *Stern*

DEPARTMENTAL MAJOR

Prerequisites. German 1-2 and 63-64, or equivalent.

Major Requirements. Conversation (German 117, 118), or equivalent, plus six advanced courses in the German Department, three of which must be on the 200-level. Additional courses from other fields will be selected in consultation with the departmental adviser.

Greek

For courses in Greek, see *Classical Studies*.

Health and Physical Education

PHYSICAL EDUCATION FOR MEN

Mr. Cameron, *Director of Physical Education and Athletics*; Professor Friedrich, *Chairman of Health and Physical Education*; Associate Professor Skinner, *Director of Undergraduate Instruction*; Assistant Professor Corrie, *Supervisor of Intramurals*; Assistant Professor Riebel, *Supervisor of Freshman Instruction*; Professor Falcone; Associate Professors Buehler, Cox, and Persons; Assistant Professors Harvey, LeBar, and Riebel; Instructors Hagler and Brown; Assistant Instructors Crowder and Gilchrist

Required Courses

Two semesters of physical education is required for graduation unless a student is excused for medical reasons. The requirement is met by the satisfactory completion of P.E. 1-2, Foundations of Physical Education, or by an alternate form of activity approved by the Men's Physical Education Department. This work will normally be completed in the freshman year.

All students are given a medical and physical examination before registration. Freshman who have physical disabilities which prevent them from participating in regular classes, should register for P.E. 11-12, Adapted Physical Education. Students who do not pass the basic swimming test are expected to register for P.E. 20, Beginning Swimming, during the spring semester of the freshman year.

Physical education courses and independent activities are conducted on a pass-fail basis. These grades are not counted toward continuation, graduation, or honors; nor are physical education required courses counted among the 32 courses needed for graduation.

1-2. Foundations of Physical Education. Information and activities related to health and fitness, including techniques in body mechanics, relaxation, control of weight, and posture. Orientation to various sports activities. On the basis of tests and factors such as body type, students are guided into those areas that best provide for their present and future needs. No course credit. *Staff*

11-12. Adaptive Physical Education. Instruction adapted to the needs and capacities of students who have physical disabilities which prevent them from participating in P.E. 1-2. No course credit. *Staff*

20. Beginning Swimming. This requirement may be waived by completing a departmental swim test.

Elective Activity Courses for Men

The activity courses listed below may be taken as electives on a pass-fail basis if they are different or more advanced than courses which a student has taken previously.* Prerequisites: Physical Education 1-2 or 11-12. Half-course.

- 100-101—Adapted Physical Education
- 110-111—Individual Development
- 121—Intermediate Swimming
- 125—Swimming and Life Saving
- 126—Advanced Swimming and Water Safety
- 127—Scuba Diving
- 130—Golf (\$25.00 fee)
- 132—Badminton/Handball
- 133—Fencing/Archery
- 140—Tennis/Volleyball
- 141—Gymnastics
- 142—Combatives

Certain non-credit departmental sponsored activities may be scheduled during the year. Included in this group of activities are: sailing, bowling, skiing, judo, and survival skills.

* The maximum amount of credit which a student may earn for elective physical education activity courses is one full course.

Elective Professional Courses

The courses listed below are arranged to meet the increasing demand for teachers who are qualified to coach and teach physical education as well as for those who may have leadership responsibilities in the area of recreation. These courses are open as electives for students in high school teaching programs and others for whom such courses may be appropriate. Teaching majors may elect semester-courses in this group. Two semester-courses may be elected from the courses listed under Special Methods in Physical Education; three from the courses listed under Theory and Practice in Physical Education; and one from Health Education. The courses must be selected with the prior approval of the director of undergraduate studies from the student's major department, in order to meet the needs of the individual.

Special Methods in Physical Education

150. Coaching Basketball in Secondary Schools. Theory and practice in the fundamentals of coaching basketball. Open to juniors and seniors. Half-course. *Brown*

151. Coaching Track in the Secondary Schools. Theory and practice in the fundamentals of coaching track. Open to juniors and seniors. Half-course. *Buehler*

152. Coaching Football in Secondary Schools. Theory and practice in the fundamentals of coaching football. Open to juniors and seniors. Half-course. *Falcone*

153. Coaching Baseball in Secondary Schools. Theory and practice in the fundamentals of coaching baseball. Open to juniors and seniors. Half-course. *Butters*

Theory and Practice in Physical Education

170. History and Principles of Physical Education. The objectives and scientific principles upon which physical education is based. This history of physical education is studied in order to show the changes in objectives, principles, and methods and as an aid in the interpretation of trends. One course. *Friedrich*

171. Recreational Leadership. Theories and philosophies of play and recreation with emphasis on leadership and application to community organizations, school, and family situations. One course. *Friedrich*

172. The Administration of Physical Education and Athletics in Secondary Schools. A case study appraisal of athletic health and physical education problems experienced in the organization and administration of athletics, health, and physical education. Open to juniors and seniors. One course. *Friedrich*

173. Protective Practices in Physical Education. Safety and protective measures, including training and rehabilitation. Open to juniors and seniors. One course. *Staff*

Health Education

192. School Health Problems. Includes topics such as physical screening, communicable disease prevention and control, and healthful school environment. One course. *Friedrich*

PHYSICAL EDUCATION FOR WOMEN

Professor Elizabeth C. Bookhout, *Chairman*; Professor Lewis, *Director of Undergraduate Studies*; Associate Professors Eddy, Spangler, Uhrhane, and Woodyard; Assistant Professors Lloyd, Raynor, and Wray; Instructors Simpson and White; Part-Time Instructor Beck

Required Physical Education Activity Courses

One year of physical education is required for graduation unless a student is excused for medical reasons. The requirement is met by satisfactory completion of two semesters of physical education activity courses or by an alternate form of activity approved by the Woman's Physical Education Department. The work will normally be completed in the freshman year. The physical education activity courses and independent activity are conducted on a pass-fail basis.

The results of tests given during Freshman Week are used to advise students in course selection. Those who are unable to pass a survival swimming test must take a swimming course; otherwise, students select activity courses appropriate to their interests and backgrounds.

1-2. Freshman Activity Courses. Each semester students take a full-semester or two half-semester activity courses selected from those listed below. They take a beginning, intermediate, or advanced section according to their skill background. No credit. *Staff*

Full-Semester Courses

Modern Dance: Beginning, Intermediate I, Intermediate II, and Choreography
Tennis
Water Safety Instructor's Course
Independent Activity (With the approval of the department.)

Half-Semester Courses

Adapted P.E. (for students restricted from full activity)	Movement Awareness
Archery: Beginning	Self-Defense
Badminton: Beginning & Intermediate	Senior Life Saving
Basketball: Intermediate & Advanced	Soccer
Bowling: Beginning & Intermediate	Softball
Conditioning Exercises	Square Dance
Equitation: Beginning & Intermediate	Swimming: Beginning, Intermediate, High Intermediate, & Advanced
Equitation: Advanced Hunt Seat	Tap Dance: Beginning
Fencing: Beginning & Intermediate	Tennis: Beginning, Intermediate, High Intermediate, & Advanced
First Aid	Track and Field
Folk Dance	Trampoline and Floor Exercise
Golf: Beginning & Intermediate	Volleyball
Gymnastics: Beginning	Independent Activity (With the approval of the department.)
Hockey	
Jogging	

51-52. Sophomore Activity Courses. Students who have not completed the physical education requirement may select from the activity courses listed above. No credit. Pass/fail grade. *Staff*

Elective Physical Education Activity Courses

61-62. Sophomore Activity Courses. Students may take, as electives, the following activity courses if they are different or more advanced than activity

courses taken to fulfill the physical education requirement. Prerequisite: P.E. 1-2. Half-course per year. *Staff*

161-162. Junior Activity Courses. Students may take, as electives, the following activity courses if they are different or more advanced than activity courses taken previously. Prerequisite: P.E. 1-2. Half-course per year. *Staff*

Elective Activity Courses*

Adapted Physical Education
Badminton: Beginning & Intermediate
Fencing: Beginning & Intermediate
Folk Dance: Philippine, Russian, Balkan,
Israeli, & Scandinavian
Golf: Beginning, Intermediate, & Advanced
Gymnastics: Beginning & Intermediate
Modern Dance: Beginning, Intermediate I,
Intermediate II, & Choreography

Senior Life Saving
Swimming: Beginning, Intermediate, Ad-
vanced, & Synchronized
Tennis: Beginning, Intermediate, High Inter-
mediate II, & Advanced
Volleyball
Water Safety Instructor's Course

Non-Credit Activity Courses

151, 152. Non-credit Elective Activity Courses. Open to upperclass women who have fulfilled the physical education requirement. No credit. *Staff*

Theory Courses in Physical Education

The courses listed in this section are open to students of The Woman's College majoring in physical education and are available as electives to undergraduate men and women majoring in other areas. The following courses meet distributional requirements in the social science division: P.E. 49S, 113D, 114, 130S, and 195S.

49S. History of Physical Education. Relationship of physical education to social, political, and religious customs of different nations and periods. One course. *Lloyd*

102. Physical Education for Early Childhood. Theory and practice in teaching basic skills, rhythms, and games to young children in grades K-3. Half-course. *Lewis*

103. Physical Education for the Intermediate Grades. Planning, organizing, and conducting physical education programs for children in grades 4-9. Half-course. *Raynor*

105. Group Leadership in Recreation. Interaction and group dynamics. Open to sophomores, juniors, and seniors. One course. *Simpson*

106. Methods and Materials in Recreation. Development of leadership skills in crafts, rhythmic activities, social recreation, and dramatics. Laboratory work includes experience with an organized recreational group. Open to sophomores, juniors, and seniors. One course. *Simpson*

113D. Mammalian Anatomy. A study of the organ systems of man, with emphasis on osteology, arthrology, and myology. One course. *Bookhout*

114. Kinesiology. A study of muscle function and analysis of human movement. Prerequisite: Physical Education 113 or Zoology 53. One course. *Bookhout*

*The maximum amount of credit which a student may earn for elective physical education activity courses is one full course.

117. Adapted Physical Education. Analysis of exercises and activities appropriate to individual needs. Theory and practice in planning and conducting adapted programs. Half-course. *Bookhout*

119S. Organization and Administration of Physical Education. A seminar on curriculum building; administration of required, intramural, and extramural programs; problems of budget, facilities, legal aspects, public relations, and safety. One course. *Staff*

120. Measurement and Evaluation in Physical Education. A study of the contribution of measurement and evaluation to the teaching process. Practice in test selection, administration, and interpretation. Half-course. *Bookhout*

130S, 131S. History of Dance. Emphasis on form, structure and content related to culture of eras. P.E. 130, Prehistoric to Duncan; P.E. 131, Duncan to Present. Two courses. *Wray*

132. Creative Rhythms in Movement. Basic theory and experience in creative rhythmic movement for grades K-12. The study of the classification and elements of movement with observation and practical experiences with children. Recommended for those students interested in dance, music, recreation, and elementary and secondary teaching. One course. *Wray*

133. Social, Folk, and Square Dance Forms. A theoretical and practical study of the historical development and resources of social, folk, and square dance forms in relation to their cultural backgrounds. Half-course. *Wray*

135, 136. Principles of Contemporary Dance Composition. Prerequisite: Beginning Modern Dance and Intermediate Modern Dance I or permission of instructor. Two courses. *White or Wray*

139. Movement Connotations. Theories and forms of human movement with emphasis on sensory awareness and non-verbal communication. One course. *Beck and Wray*

181. Methods and Materials in Team Sports. Basic theory and practice in teaching team sports for women. One course. *Spangler and Woodyard*

182. Methods and Materials in Individual and Dual Sports. Basic theory and practice in teaching these sports. One course. *Lewis and Staff*

185. Advanced Methods of Teaching and Officiating. One course. *Lewis and Staff*

191, 192. Independent Study. Directed reading and research. Open to highly qualified juniors and seniors. Two courses. *Staff*

195S. Recent Research in Physical Education and Related Fields. One course. *Staff*

HEALTH EDUCATION COURSES (MEN AND WOMEN)

The following health education courses meet distributional requirements in social science: H.E. 137, 138S, 140S, and 170T.

101-102. Health Education Fundamentals, Methods, and Materials. Designed specifically for and open only to physical education majors. Basic studies

in personal and community health; administration; curriculum and program planning; health services and health counseling; selection, purchase, and care of equipment; library sources; methods and materials for effective health teaching; evaluation techniques and procedures. Two courses. *Uhrhane*

134. School Health. Organization of the school health program; basic health problems in school; methods and materials for teaching about health. Primarily designed for students preparing to teach in elementary or secondary schools. Open to men and women. Juniors and seniors only. Half-course. *Uhrhane*

137. Health in Developing Countries. Health conditions, practices, and problems interacting with economics, productivity, and progress of emerging nations, with some emphasis on African states. One course. *Uhrhane*

138S. Health Problems in Metropolitan Areas. Relationships between urbanization and health illustrated by environmental hazards, population motion, food distribution, housing, city planning, poverty, drug usage, and consumer awareness. One course. *Uhrhane*

140S. Gereology and Health. Health implications in relationships within families and between generations in the changing role of the elderly in modern society, in retirement, and in extended leisure time; illness, disability, and medical care. One course. *Uhrhane*

170T. Special Health Problems. Problems and issues in health affairs selected by students for independent study. One course. *Uhrhane*

Major in Physical Education

A major in physical education is offered to students in The Woman's College who wish to prepare for teaching physical education, recreational leadership, physical therapy, or graduate study. The program may also be planned with emphasis on dance or health.

Prerequisites. Biology 11-12, Biology 14, or Chemistry 1, 2; P.E. 49S. History of Physical Education.

Major Requirements. Eight courses distributed as follows:

P.E. 113D. Mammalian Anatomy

P.E. 114. Kinesiology

Zoology 151. Principles of Physiology

One course in health education.

One seminar selected from P.E. 119S, P.E. 195S, H.E. 138S, or H.E. 140S.

Three additional courses in physical education or health education.

Note: Students who are interested in full-time or part-time teaching in physical education and health should consult the Director of Undergraduate Studies in the Women's Physical Education Department for course selection to meet appropriate certification requirements.

History

Professor Colton, *Chairman*; Professor Hollyday, *Director of Undergraduate Studies*; Associate Professor Cell, *Acting Supervisor of Freshman Instruction*; Professors Alden, Durden, Embree, Ferguson, Hamilton, Holley, Lanning, Parker,

Preston, Ropp, A. Scott, W. Scott, Silberman, TePaske, Watson, and Young; Associate Professors Acomb, Brieger, Davis, Lerner, and Witt; Assistant Professors Cahow, Chafe, Gavins, Hartwig, Mauskopf, Miller, and Nathans; Instructor Dirlik; Part-time Instructors Gilpin, Sweets, Thomson, and Williams

The undergraduate courses in history are designed to afford (1) an introduction to the study of history; (2) a more intensive study of general American history; (3) opportunities for more advanced study of phases of American, English, European, Hispanic-American, Russian, African, and Asian history.

Prerequisite. A year sequence (two courses) selected from one of the following introductory courses (1D-2D, 1S-2S, 51-52, 53-54, 61D-62D, 91-92) or the equivalent through advanced placement or reading out of the courses is prerequisite for all other courses. Additional courses may be chosen from this group as electives or as part of the departmental major. However, seniors may take advanced courses without these prerequisites if they secure the permission of the instructor and the Director of Undergraduate Studies.

1D, 2D. A History of European Civilization. Major problems in the development and world impact of European civilization, critical evaluation of historical interpretations, and investigation of history from primary sources. From the Ancient Greeks to the present. Two courses. Open only to freshmen except by approval of the Director of Undergraduate Studies; lectures and small discussion groups. *Cell, Gilpin, Lerner, Mauskopf, Miller, Oates, Parker, Sweets, Thomson, Witt, and Young*

51, 52. A History of European Civilization. From the Italian Renaissance to the present. (Not open to students who have had History 1-2.) Two courses. *Acomb, Ferguson, Hollyday, Parker, Ropp, and W. Scott*

51P, 52P. Preceptorial. Elective preceptorial for students enrolled in History 51, 52. *Staff*

53. Greek History. (Listed also as Classical Studies 53.) One course. *Nixon*

54. Roman History. (Listed also as Classical Studies 54.) One course. *Nixon*

61D, 62D. From Tradition to Revolution. Societies in change: Asia, Africa, and Latin America. Traditional ideas and institutions of selected areas; effects of modernization. Two courses. *Dirlik, Embree, Hartwig, Silberman, and TePaske*

91. The Development of American Democracy to 1865. A study of the trends vital to an understanding of the United States today. The main theme is the development of American democracy. Problems of foreign policy, the growth of capitalism, political practices, social reform, and conflicting ideals are considered in relation to this main theme. One course. *Cahow, Davis, Durden, Gavins, Holley, Nathans, A. Scott, and Williams*

92. The Development of American Democracy, 1865 to the Present. A continuation of History 91 with emphasis upon the emergence of contemporary problems. One course. *Cahow, Davis, Durden, Gavins, Holley, Nathans, A. Scott, and Williams*

91P, 92P. Preceptorial. Elective preceptorial for students enrolled in History 91, 92. *A. Scott*

Other Undergraduate Courses

83, 84. Afro-American History, 1619 to the Present. The Black experience in the United States from slavery to the contemporary age. (Open to majors in Black Studies without prerequisite.) Two courses. *Gavins*

93. Modern Technology. An introduction to the history of modern Western technology, with special emphasis on the nineteenth and twentieth centuries. Technological development will be related to the political, economic, and scientific trends discussed in History 1, 2 or 51, 52. One course. *Ropp*

99. Naval History and Elementary Strategy. After a review of earlier periods, attention is given to the importance of sea-power in more recent times and to naval actions, especially in the two World Wars. This course is not open to students who have had N. S. 102. One course. *Ropp*

101, 102. Introduction to the Civilizations of Southern Asia. (See Interdisciplinary Course 101, 102.)

103, 104. Renaissance and Reformation. Europe 1250-1600. Two courses. *Witt*

105, 106. Political and Constitutional History of England. The origins and evolution of the principal institutions of the English government, related to their setting in a changing society. Two courses. *Hamilton*

107, 108. Social and Cultural History of England. English history from the fourteenth century to the present time in an effort to arrive at a synthesis of social and political events and thus provide a background for the study of English literature. Two courses. *Ferguson*

111, 112. America in the Colonial and Early Modern Era. The history of America from the discovery to the beginning of the Civil War. Two courses. *Alden*

113, 114. America in the Twentieth Century. Political, economic, and social problems of twentieth-century United States. Emphasis is placed on reform movements from the Muckrakers through the Fair Deal, the emergence of the United States as a world power with conflicting ideas and ideologies. Two courses. *Watson*

115, 116. History of Africa. Social, political, and economic developments in tropical Africa. First semester: cultural background and precolonial history. Second semester: colonial and contemporary times. Two courses. *Hartwig*

117, 118. European Imperialism and Colonialism. The age of discovery, the new imperialism, and modernization of post-colonial societies. Two courses. *Cell*

119, 120. History of Socialism and Communism. The origins and development of socialist and communist movements from pre-Marxian times to the present. Two courses. *Lerner*

- 121, 122. Diplomatic History of the United States.** Emphasis on those factors, foreign and domestic, that have shaped the foreign policies of the Republic. Two courses. *Davis*
- 123, 124. City and Frontier in American History.** The westward movement and the progress of urbanization with attention to the social and political consequences. Two courses. *A. Scott*
- 125. The Athenian Empire.** (Also listed as Classical Studies 134.) One course. *Staff*
- 126. Alexander the Great.** (Also listed as Classical Studies 135.) One course. *Staff*
- 127. History of Latin America through the Formation of the National Governments.** One course. *Lanning and TePaske*
- 128. Inter-American Affairs.** This course treats the relations of the Latin-American states with each other and with the United States with the design of explaining the current significance of Latin America. Chief emphasis is placed upon social problems and movements common to all the republics and upon the role of the United States in Latin American affairs. One course. *Lanning*
- 129, 130. Society and Government in the United States 1789-1877.** Two courses. *Nathans*
- 131. Mexico and the Caribbean from the Wars of Independence to the Present.** One course. *TePaske*
- 132. The Major South American Powers from the Wars of Independence to the Present.** One course. *TePaske*
- 133, 134. Medieval History.** Europe, 300-1500. Two courses. *Young*
- 135, 136. Europe in the Twentieth Century.** Political, economic, and intellectual developments in Europe since 1900. First semester to 1933; second semester to the present day. Two courses. *Colton*
- 137, 138. Foreign Relations of the European Powers.** European diplomacy and Europe's position in the world since 1870, with an introductory survey of diplomatic institutions since the Renaissance. Two courses. *W. Scott*
- 139, 140. Nineteenth-Century Europe.** With special attention to Germany and Austria-Hungary, this course emphasizes the development of European nationalism and the clash of freedom and authority. Two courses. *Hollyday*
- 141, 142. History of China.** From early times; emphasis on modern transformations since the nineteenth century. Two courses. *Dirlik*
- 143, 144. History of Modern Japan.** Japan from 1600 to the present; the transition from the traditional to the modern state. Two courses. *Silberman*
- 147. History of India to 1707.** Early development, classical Hindu civilization, the impact of Islam, first modern contacts. One course. *Embree*
- 148. History of India and Pakistan, 1707 to the Present.** Decay of the

Mughal Empire, social and economic impact of Western rule, development of nationalism and independence. One course. *Embree*

149. Military History. War, politics, and technology. One course. *Ropp*

150. The Concept of the Democratic Faith. One course. *Cahow*

157, 158. The Rise of Modern Science. The development of science and medicine, with attention to cultural and social influences upon science. First semester: through Newton. Second semester: eighteenth to twentieth centuries. Two courses. *Mauskopf*

160. The United States from the New Deal to the Present. One course. *Chafe*

161, 162. History of Russia. From Kievan to Soviet Russia. An exploration into the processes of social change. Two courses. *Miller*

163, 164. Reform and Politics in Nineteenth-Century America. First semester: the coming of the Civil War, with emphasis on the reform movements of the Jackson era, the anti-slavery crusade, and national politics to 1861. Second semester: reform and politics from the War and Reconstruction era to the Farmers Revolt of the 1890's. Two courses. *Durden*

167, 168. Modern European Intellectual and Cultural History. Leading European thinkers from the Enlightenment to the present. Two courses. *Parker*

199. The Changing South. (See Interdisciplinary Course 199.)

For Seniors and Graduates

Students may receive credit for either semester of a hyphenated course at the 200-level without taking the other semester if they obtain written permission from the instructor and either the Director of Undergraduate Studies or the Director of Graduate Studies.

201-202. History of Russia, 1801-1917. Origins and dynamics of the Russian revolutionary movement, the intelligentsia, and the emergence of political parties. Two courses. *Miller*

207-208. American Urban History. American urbanization since the colonial period. Each student is responsible for the history of a particular city, with attention to the emerging methodology of urban studies. Two courses. *A. Scott*

209-210. Afro-American History, 1619 - Present. Two courses. *Gavins*

211. The United States and Latin America: A History of Inter-American Problems. American intervention, anti-Americanism, the United States in Latin American writings, Pan-Hispanism, investment and expropriation, the Pan-American movement, and defense of the Hemisphere. One course. *Lanning*

212. Recent Interpretations of United States History. A course designed to encourage a critical evaluation of major issues in United States history through examination of recent interpretations of key problems. (Open only to history graduate students and seniors doing practice teaching in one of their final two semesters.) One course. *Watson*

215-216. The Diplomatic History of the United States. Two courses.

Davis

219. Political Processes in Traditional and Modern Africa. (Also listed as Political Science 271.) One course. *Hartwig and Johns*

221-222. Problems in the History of Late Medieval Europe and Early Modern Europe. Two courses. *Witt*

223-224. The Old Regime and the French Revolution, 1661-1815. A study of social, political, and intellectual revolutions in continental Europe, centering on France and giving special attention to successive interpretations of historical change. Two courses. *Acomb*

225, 226. The Age of the Reformation. Interaction of political and religious developments in sixteenth-century Europe. Two courses.

229. Recent Interpretations of Modern European History. A course designed to develop the ability to appraise critical historical issues through the study and discussion of recent interpretations of key historical problems in modern European history. (Open only to history graduate students and seniors doing practice teaching in one of their final two semesters.) One course. *Parker*

230. History of Spain. Late medieval period to the present. One course. *TePaske*

231-232. The Hispanic Colonies and Republics in America. First semester: the Spanish Conquest; the church, race, and society; universities, medicine, and science. Second semester: the wars of independence, problems of land, education, and public health. Two courses. *Lanning*

233-234. The Institutional, Cultural, and Social History of Hispanic America. Two courses. *Lanning*

237-238. Europe in the Middle Ages, 395-1500. Two courses. *Young*

240. Aspects of Traditional and Modern African Culture. Introduction to the oral and written literatures and musical and artistic traditions. One course. *Hartwig*

241-242. Modernization and Revolution in China Since 1850. Two courses. *Dirlik*

247. History of Modern India and Pakistan, 1707-1857. Analysis and interpretation, with special emphasis on social and economic change. One course. *Embree*

248. History of Modern India and Pakistan, 1857 to the Present. One course. *Embree*

249-250. Social and Intellectual History of the United States. The interplay of ideas and social practice through the examination of attitudes and institutions in such fields as science and technology, law, learning, and religion. Two courses. *Holley*

261-262. Problems in Soviet History. Studies in the background of the

Revolution of 1917 and the history and politics of the Soviet state. Two courses.
Lerner

263-264. American Colonial History and the Revolution, 1607-1789. The founding and institutional development of the English colonies; the background, progress, and results of the Revolution. Two courses. *Alden*

265-266. Modern South America. Political, social, and economic history of the leading South American nations from the mid-nineteenth century to the present. Two courses. *TePaske*

267-268. From Medieval to Early Modern England. The intellectual, social, and political problems of transition to modern England, with special emphasis on the English Renaissance. Two courses. *Ferguson*

269. British History from 1714 to 1867. The Glorious Revolution, constitutional evolution, political methodology, Industrial Revolution, reforms, considered in context of the relationship of ideas and events. One course. *Hamilton*

270. British History from Mid-Nineteenth Century. Liberals and Conservatives, Irish Home Rule, the empire, wars and economic decline, the welfare state. One course. *Hamilton*

273, 274. Topics in the History of Science. Critical stages in the evolution of scientific thought. Two courses. *Mauskopf*

275-276. Central Europe, 1849-1914. Conflict between liberalism and authoritarianism, clash of nationalities, and domestic changes in Germany and Austria-Hungary. Two courses. *Hollyday*

277-278. The Era of the Civil War and Its Aftermath, 1820-1900. Two courses. *Durden*

281-282. Development of Modern Medicine. Two courses. *Brieger*

283-284. Political and Social Change in the United States, 1789-1860. Two courses. *Nathans*

287-288. History of Modern Japan. The political, economic, and social development of Japan since 1750; factors contributing to Japan's emergence as a modern state. Two courses. *Silberman*

290. East African History. One course. *Hartwig*

296. Canada from the French Settlement. Problems in the development of Canada and its provinces. One course. *Preston*

297. The British Empire in the Nineteenth Century. (From 1783.) The development of the Empire from the American Revolution to the imperialism that culminated in the South African War. One course. *Preston*

298. The Commonwealth in the Twentieth Century. The origins and evolution of the Commonwealth of Nations and its adjustment in the age of anti-colonialism. One course. *Preston*

For other courses in Ancient History which may be taken for credit in History or Classical Studies, see Classical Studies 253—*Greece to the Orientalizing Period*;

254—*The Age of the Tyrants and the Persian Wars*; 255—*The Age of Pericles*;
256—*The Fourth Century through Alexander*.

Independent Study

191, 192. Independent Study. Directed reading and research. Admission will be subject to approval of the individual instructor and the Director of Undergraduate Studies. Two courses. *Staff*

193, 194. Independent Study. Same as 191, 192, but for seniors. Two or four courses. *Staff*

Undergraduate Seminars

97-98. Sophomore Seminar. Open to sophomores on application to the Director of Undergraduate Studies and with permission of the instructor. Two Courses.

The following seminars are designed to offer opportunities for reading and historical investigation in significant problems. Juniors as well as seniors may apply for admission to these courses, and are urged to do so if they expect to be candidates for Graduation with Distinction in History or if they expect to practice-teach in their senior year. All seminars are open to non-majors as well as to majors.

195A-196A. Renaissance Intellectual History. Studies in the transformation of European thought between 1300 and 1600. Two courses. *Witt*

195B-196B. Twentieth-Century Europe. Two courses. *Colton*

195C-196C. Problems in American Intellectual History. (Students may not receive credit for this course and 249-250.) Two courses. *Holley*

195D-196D. Problems in Twentieth-Century United States History. Two courses. *Chafe and Watson*

195E-196E. American History Before 1789. Two courses. *Alden*

195F-196F. The Era of the Civil War and Its Aftermath, 1820-1900. (Students may not receive credit for this course and 163-164.) Two courses. *Durden*

195G-196G. Nationalism and Communism in the Far East. Two courses. *Dirlik*

195H-196H. From Rural to Urban Society in the United States. Two courses. *A. Scott*

195I-196I. Nationalism and Freedom in Nineteenth-Century Europe. Two courses. *Hollyday*

195J-196J. Studies in the History of Socialism and Communism. Two courses. *Lerner*

195K-196K. Social Change in Modern Britain. Two courses. *Cell*

195L-196L. Europe in the Age of the Reformation, 1500-1650. Two courses.

- 195M-196M. **Europe and the World since 1914.** Two courses. *W. Scott*
- 195N-196N. **The English Renaissance.** Two courses. *Ferguson*
- 195R-196R. **The Age of Newton.** Two courses. *Mauskopf*
- 195S-196S. **Processes of Development in Modern Japan, 1800 to the Present.** Two courses. *Silberman*
- 195T-196T. **Problems in the History of Russia Before 1917.** Two courses. *Miller*
- 195U-196U. **Social Conflict and Political Change in the United States, 1789 - 1860.** Two courses. *Nathans*
- 195V-196V. **Problems in Afro-American History.** Two courses. *Gavins*
- 195W-196W. **Studies in Modern Indian History.** Two courses. *Embree*
- 195X-196X. **Problems in Latin American History.** Two courses. *TePaske*
- 195Y-196Y. **Issues in the History of Tropical Africa before 1900.** Two courses. *Hartwig*
- 195Z-196Z. **Problems in Recent American Diplomatic History.** Two courses. *Davis*

196.99 History Honors Pro-Seminar. Required in the spring semester of juniors selected for the Senior Honors Seminar of the following year. Conferences on selection of research topics and research techniques. Half-course. *Cell, Holley, and Parker*

197-198. Senior Honors Seminar. A course designated to introduce qualified students to advanced methods of historical research and writing and to the appraisal of critical historical issues. Open only to seniors, but not restricted to candidates for degree with distinction. This course, when taken by a history major, would be in addition to the two courses required in 195-196 seminars or 200-level courses of the History Department. Two courses. *Cell, Holley, and Parker*

DEPARTMENTAL MAJOR

Prerequisite. Two introductory courses in history (1D-2D, 1S-2S, 51-52, 53-54, 61D-62D, 91-92).

Major Requirements. Students desiring to take a major in history are required to elect, in addition to the two prerequisite courses, six courses in the department, including two courses in either an undergraduate seminar (195-196) or any two courses on the 200-level. Students wishing to take the more advanced courses in American history are advised to elect History 91-92 in the sophomore or junior year.

Honors. Any student who is qualified (see the section on Honors in this *Bulletin* for general requirements) may undertake work leading to a degree with distinction in history by presenting himself to his history faculty adviser as a candidate. Normally, honors work involves participation in one of the undergraduate seminars during the junior year and selection for the Senior Honors Seminar in the senior year. Further information is available at the History Department office, 236 Allen, West Campus, or 102 West Duke Bldg., East Campus.

Other departments and courses of particular interest to History majors include:

Anthropology.

Art. History of Art.

Economics.

Education. 113, 207, 225.

English and American Literature.

German, Greek, Latin, Russian, and the Romance Languages. The Literature courses that are not primarily conversation or composition.

Greek, Latin. Except those courses that are primarily grammar or composition.

Interdisciplinary. 101, 102, 199.

Linguistics. 101.

Music. History of Music.

Philosophy. Except 48.

Political Science.

Psychology. 92, 93, 94, 101.

Religion. Especially those numbered above 100.

Sociology.

House Courses

See page 39 for information about house courses. Since each house course is offered one time only they are not listed or described here.

Interdisciplinary Courses

The following are cooperative courses offered by the departments concerned. Where a department accepts the course for the major, the same number is used as a departmental offering.

101, 102. Introduction to the Civilizations of Southern Asia. Hindu, Islamic, and Buddhist foundations, impact of the West, and emergence of the modern nation-states of Southern Asia. The first semester will analyze traditional Hindu civilization and the Islamic impact on Southern Asia. The second semester will examine Western influences and the development of modern societies and states in Southern Asia. Two courses. *Apte, Braibanti, Embree, Fox, McCormack, Spengler, and Tangri*

104. Man and the Marine Environment. For description see Marine Sciences.

109. Themes in Contemporary Jewish Thought. Religious, social, and political issues confronting the contemporary Jew in the United States. Half-course. *Meyers*

156. The Contemporary Woman: History and Prospects. A survey of the status of women with consideration of biological, socioeconomic, psychological, and political aspects. Half-course. *Kreps, A. Scott, and R. Kramer*

167S. Ecology and Social Action. An introductory survey of the ecosystem and its problems; consideration of political and social solutions to them. One course. (See the Departments of Botany and Political Science.) *Strain and Leach*

199. The Changing South. A survey of the geography, demography, economics, politics, and culture of the South. (See the Departments of Anthropology, Economics, History, Political Science, and Sociology.) One course.

Italian

For courses offered in Italian, see *Romance Languages*.

Latin

For courses offered in Latin, see *Classical Studies*.

Linguistics

The courses in linguistics may be taken as electives by advanced students; certain courses serve as related work in several departments (see the entries for related work under the separate departments).

No major is offered in linguistics. Students interested in the study of language as part of their undergraduate program or as a preparation for graduate work in linguistics should consult the instructors of the courses listed below.

For a description of the following courses consult the listings under the specified department.

Introduction to Linguistics. (English 107.) *Butters*

Language and Society. (Anthropology 238.) *Apte*

Indo-Aryan Linguistics. (Anthropology 240.) *Apte*

Linguistic Anthropology. (Anthropology 260, 261.) *Apte*

Development of the English Language. (English 108.)

Modern English Grammar. (English 109.) *Butters*

Old English Grammar and Readings. (English 207.) *Nygaard*

History of the English Language. (English 208.) *Nygaard*

Present-Day English. (English 209.) *Nygaard and Reiss*

Old French Literature. (French 219.) *Vincent*

Dutch. (German 181, 182.) *Stern*

Middle High German. (German 205, 206.) *Stern*

History of the German Language. (German 216.) *Stern*

Applied Linguistics. (German 219.) *Stern*

Symbolic Logic. (Philosophy 103.)

Philosophy of Language. (Philosophy 109.) *Welsh*

Romance Linguistics. (Romance Languages 224.) *Hull*

Old Spanish Languages. (Spanish 257.) *Davis*

Management Sciences

Professor Volpp, *Chairman*; Professor Dickens, *Director of Undergraduate Studies*; Professors Baligh, Black, Joerg, and Keller; Associate Professors Battle, Burton, Dellinger, and Pondy; Assistant Professors Aldrich, Damon, Hagerman, Kuhn, Maier, Petersen, and VanderWeide

The courses offered by the Department of Management Sciences stress conceptual understanding of, and analytical reasoning related to, problems of modern management, and the relationship between the performance of complex organizations and the society in which they operate.

50. Elementary Theory of Economic Enterprise. Analysis of the internal resource allocation problem of the enterprise, of market structures, and the relationship between the two. Topics include marginal analysis, theories of competitive market structures, and introduction to special problems of finance, marketing, and production. Prerequisite or corequisite: Math 32. One course.

50P. Preceptorial. Elective preceptorial for students enrolled in Management Sciences 50. *Staff*

55. Quantitative Analysis for Management. Some mathematical theory and techniques used in the study of economic enterprise, such as classical optimization, optimization under constraints, introductory matrix and linear algebra, basic probability theory, special probability distributions. Not open to students who have had Economics 54, Mathematics 73, or Mathematics 135. Prerequisite: Math 31. One course.

60D. Probability and Statistics for Decision Problems. Fundamentals of probability theory, classical and Bayesian statistical analysis, and elementary decision theory. The application of statistical analysis to decision problems is stressed. Topics include sample spaces, probability distributions, combinations and permutations, functions of random variables. Bayes Theorem, Central Limit Theorem, estimation, analysis of variance, regression and correlation analysis, utility, risk, uncertainty, and decision criteria. Prerequisite or corequisite: Mathematics 73 or Economics 54. One course.

100. Introduction to Financial Accounting. Conceptual framework of external reporting, focusing on the nature and purpose of accounting, the measurement of status and activity in economic terms and the interpretation of published financial statements. Prerequisite: sophomore standing. One course.

110. Statistics for Management Decisions. Fundamentals of classical and Bayesian statistical analysis and elementary decision theory. Application of statistical analysis to decision problems. Topics include a review of sampling distributions, point and interval estimation, hypothesis testing, decision theory, and regression and correlation analysis (including computer routines). Not open to students who have had Management Sciences 60, Economics 138, or Mathematics 136. Prerequisites: Management Sciences 55, Mathematics 135, or Economics 54. One course.

120. Organization Theory. Introduction to recent theories of, and research on, the structure and behavior of complex organizations, with special reference to business firms. Topics to be covered include: rationality, authority, bureaucracy, and other concepts; power, decision-making, informal organization, organization change, and other internal process phenomena; effects of technology, culture, and other environmental influences; brief consideration of organization design. Prerequisites: Management Sciences 50, 55 or equivalent. One course.

125. Management of Public Enterprises. Resource allocation within and among major public sector projects in a mixed economy. Emphasis on non-market

decision-making for governmental agencies and other non-profit organizations. Prerequisite: junior standing or Management Sciences 50 or Economics 52. One course.

130. Information Systems. An analysis of the data needed for economic decisions relating to business enterprises and of the systems used in accumulating, analyzing, interpreting, and presenting the data to various users. Financial reporting to external users and managerial use of information for decision-making are stressed. Prerequisites: Management Sciences 50, 55, or equivalent. One course.

140. Operations Research. Introduction to the use of mathematical models in the analysis of decision problems. Topics include mathematical programming, game theory, dynamic programming, queuing theory, simulation, and inventory models. Use of electronic computer will be included. Prerequisites: Management Sciences 50, 55, or equivalent, and computer programming competence. One course.

191, 192. Independent Study. Directed reading and research. Approval of the instructor and the Director of Undergraduate Studies required.

193, 194. Independent Study. Same as 191, 192 but for seniors.

210S. Intermediate Theory of Economic Enterprise. Introduction to competitive market strategies and cooperating decisions and analysis of the efficiency and equilibrium of market structures. Emphasis is on the effects of the economic environment on the decision of the enterprise, and conversely. Prerequisites: Management Sciences 120, 130, and 140. One course.

211S. Finance. An analysis of the problems of management of the financial affairs of the firm with particular attention to the long term capital needs and the development of an optimal capital structure. Prerequisites: Management Sciences 120, 130, and 140, or permission. One course.

213S. Marketing. An examination of public policy and the marketing behavior of private enterprise and the creation of a marketing program for the firm. Prerequisites: Management Sciences 110, 120, 130, and 140, or permission. One course.

215S. Production. An economic and social analysis of the problems of designing a production system for an organization, of operating within the constraints of a given production system, and of the interactions between a production system and other components of the organization and with society. Prerequisites: Management Sciences 110, 120, 130, and 140, or permission. One course.

220S. Advanced Organization Theory. Continuation of Management Sciences 120S, but with extension to non-market organizations such as labor unions, universities, hospitals, and governmental units. Special emphasis will be placed on the following topics: development and testing of mathematical models of organization; optimum organization design; treatment of organization as political coalitions, using game theoretic concepts; consideration of the social choice questions. Prerequisites: Management Sciences 120, 130, and 140, or permission. One course.

230S. Controllershship. An analysis of the use of accounting information in the planning, control, and decision-making process in the business enterprise. Topics include methods of cost accumulation, development of standards, the basic patterns of cost behavior, budgeting techniques for aiding long-range planning and the

making of specific decisions. Prerequisites: Management Sciences 120, 130, and 140, or permission. One course.

231S. Financial Accounting. An in-depth analysis of the requirements of outsiders (investors, auditors, unions, and governments) for information about the status and operations of firms and a framework for disclosure of the relevant data. Prerequisites: Management Sciences 120, 130, and 140, or permission. One course.

232S. Internal Control and Auditing. An analysis of the accounting control system and the independent auditor's examination of that system and other evidence as a basis for expressing an opinion on a client's financial statements. Topics include basic audit objectives, standards, ethics, terminology, procedures, and reports. Prerequisites: Management Sciences 110 and 231, or permission. One course.

233S. Federal Income Taxation. A study of the principles of federal income tax laws as related to corporations and individuals. Tax planning and the effect of tax law on business decisions will be emphasized. Prerequisite: Management Sciences 231 or permission. One course.

234, 235, 236. CPA Preparation. Intensive preparation for the Certified Public Accountant's Examination, including fundamental principles of commercial law, advanced accounting problems, and accounting theory. Prerequisites: Management Sciences 230 and 231 or permission. (Those who do not wish credit may take Management Sciences 234, 236 for \$40.00 per semester.) One course each.

240S. Advanced Operations Research. The application of operations research methodology to real world problems. Special emphasis will be placed on problem formulation, model-building, model validation and evaluation, sensitivity analysis, interpretation of results, and implementation. Prerequisites: Management Sciences 120, 130, and 140, or permission. One course.

241S. Decision Theory. A study of the structure of decision problems arising in the operation of an organization, alternative decision criteria, and the development of decision rules for rational behavior. Included will be an investigation of decision-making under certainty, risk, and uncertainty, decision-making in competitive situations, and the cost and value of information. Prerequisites: Management Sciences 110, 120, 130, and 140, or permission. One course.

289S. Research Methodology. Philosophy and logic of research in the social sciences (nature of explanation; normative and positive theories; functional, rational, and conflict models); theory development and model construction (including attention to testability of inferences, problems of identification, etc.); experimental design, data collection, and data analysis (including attention to problems of uncontrolled experiments, sampling theory, comparison of case studies, survey research, field experiments, use of published data). Prerequisites for management sciences majors: Management Sciences 120, 130, and 140. For non-business majors; one semester of statistics, computer programming, one upper-level mathematics course, and at least three social science courses beyond the introductory level. One course.

DEPARTMENTAL MAJOR

The Department of Management Sciences offers specialization in two areas—accounting and management science. Each program requires that the student take the same prerequisite courses.

Prerequisites and corequisites required of all majors in the department; Mathematics 31, 32.

Required courses. Management Sciences 50, 55, 110, 120, 130, 140, and 210, plus one elective from 200-level courses. The elective work required for specialization in accounting includes Management Sciences 230, 231, 232, and 233.

Marine Sciences—The University Program

Professor Costlow, *Director*; Professors Bookhout (Zoology) and Johnson* (Botany); Associate Professors Barber (Zoology), Pilkey* (Geology), and Searles* (Botany); Assistant Professors Gutknecht* (Physiology), Sullivan (Biochemistry), Sutherland (Zoology), and Forward (Zoology)

The interdisciplinary program in the marine sciences makes it possible for qualified juniors and seniors to live and study at the Duke University Marine Laboratory, Beaufort, North Carolina, during the spring term. The semester program consists of the two courses and seminar described below (104, 169, and 171) in addition to independent research. The design of the program permits a student to continue study at the Marine Laboratory during the summer either by participating in senior-graduate courses or by continuing the independent studies initiated during the spring term.

Applications are to be submitted by October 7 to the Director, Duke University Marine Laboratory, Beaufort, North Carolina 28516, and should include two letters of recommendation, one of which must be from the director of undergraduate studies of the student's major department. A current transcript is also required. The review committee will be composed of the Director of the Laboratory and the directors of undergraduate studies of the participating departments. Students will be notified of the action of the committee prior to preregistration for the spring semester.

104. Man and the Marine Environment. Economic, legal, medical, political, social, and scientific viewpoints on the extent to which modern society has affected the marine environment with special emphasis on problems of coastal North Carolina. Lectures and laboratories. Prerequisite: permission of instructor and director of undergraduate studies of student's major department. (Listed as Interdisciplinary Course 104). One course. *Costlow and Staff*

169L. The Marine Environment. The interrelationships of the geological, chemical, and biological aspects of the estuarine and oceanic environments. Lectures and laboratories. Prerequisite: introductory chemistry and consent of instructor and director of undergraduate studies. (Listed as Botany 169, Geology 169, and Zoology 169.) One course. *Sutherland and Staff*

171S. Marine Sciences Seminar. Lectures and discussions on current research involving biological, chemical, and geological aspects of estuarine and oceanic environments. Prerequisite: permission of instructor and director of undergraduate studies. (Listed as Botany 171, Geology 171, and Zoology 171.) Half-course. *Barber and Staff*

Independent Study or Special Problems (credit value of one and one-half courses) are to be registered for under the appropriate course numbers of the student's major department.

*In residence during summer only.

For Seniors and Graduates

For descriptions of the following courses consult the listings under the specified departments or the *Bulletin of the Duke University Marine Laboratory*.

S203. Marine Ecology. (Listed as Zoology 203). Two courses. *Sutherland*

S205. Geological Oceanography. (Listed as Geology 205). Two courses. *Pilkey*

S205. Introductory Marine Microbiology. (Listed as Botany 205). Two courses. *Searles and Johnson*

S211. Marine Phycology. (Listed as Botany 211). Two courses. *Searles*

S212. Marine Membrane Physiology. (Listed as Physiology 212 and Zoology 212L.) Two courses. *Gutknecht, Schoffeniels, Wachtel, and Staff*

S214. Biological Oceanography. (Listed as Zoology 214). Two courses. *Barber*

S240. Chemical Oceanography. (Listed as Chemistry 240 and Zoology 240). Two courses. *Staff*

S250. Physiological Ecology of Marine Animals. (Listed as Zoology 250). Two courses. *Staff*

S274. Marine Invertebrate Zoology. (Listed as Zoology 274). Two courses. *Staff*

S276. Comparative and Evolutionary Biochemistry. (Listed as Biochemistry 276 and Zoology 276). Two courses. *Sullivan*

S278. Invertebrate Embryology. (Listed as Zoology 278). Two courses. *Bookhout*

Mathematics

Professor Shoenfield, *Chairman*; Associate Professor Hodel, *Director of Undergraduate Studies*; Associate Professor Kitchen, *Supervisor of Freshman Instruction*; Professors Carlitz, Dressel, Murray, Warner, Weisfeld, and Woodbury; Associate Professors Burdick, Smith, and Stackelberg; Assistant Professors Henson, Herr, Kraines, Lees, MacKichan, Moore, O'Fallon, Scoville, Wilkinson, and Wong; Instructors Katz and Smith

17. Introduction to Finite Mathematics. A course designed to introduce students to some of the concepts in modern mathematics. Elementary logic, sets and subsets, vectors and matrices, and probability theory are studied. Some applications of these topics to the biological, social, and physical sciences are considered. Prerequisite: three units of college preparatory mathematics. One course. *Staff*

31, 32. Introductory Mathematical Analysis. Language of logic and sets, elementary and transcendental functions, continuity, differentiation, integration, the fundamental theorem of the calculus, sequences, series, Taylor's formula. Prerequisite: three units of college preparatory mathematics. Mathematics 31 is prerequisite to Mathematics 32. Two courses. *Staff*

31P, 32P. Preceptorial. Elective preceptorial for students enrolled in Mathematics 31, 32. *Staff*

51. Introduction to Digital Computation. For a description of the course, see Computer Science 51. One course. *Gallie*

63. Intermediate Calculus. Taylor's formula, infinite series, partial derivatives, solid analytic geometry with vectors, functions of several variables, multiple integrals. Prerequisite: Mathematics 32. One course. *Staff*

68. Introduction to Linear Algebra. A basic course in the geometry of vectors in Euclidean n -space, real vector spaces, simultaneous equations, linear transformations and matrix representation, elementary row operations, equivalence and similarity of matrices, determinants, and quadratic forms. Prerequisite: Mathematics 17 or 31. One course. *Staff*

73, 74. Linear Algebra and Intermediate Mathematical Analysis. Real and complex vector spaces, linear transformations and matrix representations, similarity of matrices, determinants, quadratic forms, partial differentiation, functions defined implicitly, multiple integrals, infinite series, linear differential equations. Prerequisite: Mathematics 32 for 73, and Mathematics 73 for 74. Two courses. *Staff*

73P, 74P. Preceptorial. Elective preceptorial for students enrolled in Mathematics 73, 74. *Staff*

111. Applied Mathematical Analysis I. Ordinary and partial linear differential equations with constant coefficients, Fourier series and their applications, vectors. Not open to students who have had Mathematics 131. Prerequisite: Mathematics 63 or 74. One course. *Staff*

112. Applied Mathematical Analysis II. Complex variables, residues, conformal mapping, matrices, Laplace and Fourier Transforms and their applications. Prerequisite: Mathematics 63 or 74. One course. *Staff*

126. Introduction to Linear Programming and Game Theory. Fundamental properties of linear programs; linear inequalities and convex sets; primal simplex method; duality; two person and matrix games; integer programming. Prerequisites: Mathematics 32 and 68 or 73 or consent of the instructor. One course. *Weisfeld*

128. Number Theory. Divisibility properties of integers; prime numbers; congruences; quadratic reciprocity; number-theoretic functions; simple continued fractions; rational approximations. Prerequisite: Mathematics 63 or 74 or permission of instructor. One course. *Staff*

129. Introduction to Modern Algebra. Elementary theory of groups, rings, and fields; construction of basic number systems. Prerequisite: Mathematics 68 or 73. One course. *Staff*

131. Elementary Differential Equations. Solution of differential equations of elementary types; formation and integration of equations arising in applications. Not open to students who have had Mathematics 111. Prerequisite: Mathematics 63 or 74. One course. *Staff*

133. Basic Statistics. Principal statistical methods including application

to psychological, economic, business administration, and educational problems. Techniques of data collection and presentation, hypothesis testing, using the chi-square, t, and F distributions, interval estimation, and linear regression. Not open to students who have had Economics 138 or Psychology 117. One course. *Staff*

135, 136. Probability and Statistics. Permutations and combinations, total and compound probability, Bayes' formula, Bernoulli's theorem, discrete distributions, central values, moments and mathematical expectation, law of large numbers, probabilities in continuum, continuous distributions, sampling distributions, confidence limits, tests of hypotheses, and analysis of variance. Prerequisite: Mathematics 63 or 74 for 135; 135 for 136. Two courses. *Burdick*

135P, 136P. Preceptorial. Elective preceptorials for students enrolled in Mathematics 135, 136. *Burdick*

139, 140. Advanced Calculus. Multiple integrals and Jacobians, infinite series, power series, differential equations, vector analysis, line and surface integrals, Green's theorem, Stoke's theorem, improper integrals. Prerequisite: Mathematics 63 or 74 for 139; and 139 for 140. Two courses. *Staff*

152. Non-Numerical Computation. For a description of this course, see Computer Science 152. One course. *Gallie*

161. Numerical Solution of Ordinary Differential Equations. Basic existence and uniqueness considerations; algorithmic procedures for step by step integration; stability theory and its limitations; accuracy analysis and numerical procedures for determining it; analogue methods and their accuracy and stability characteristics. Prerequisite: Mathematics 74. One course. *Murray*

166. Foundations of Applied Mathematics. Intellectual basis of applied mathematics and its relationship with the historical development of epistemological theory. Criteria of validity and consistency as applied to the logical tools of linguistics, symbolism, abstraction, gaming, and simulation. Prerequisite: Mathematics 74. One course. *Murray*

171S. Elementary Topology. Basic set theory; metric spaces; topological spaces; continuity; basic topological properties including compactness and connectedness. Prerequisite: Mathematics 63 or 74. One course. *Staff*

181. Complex Analysis. Complex numbers, analytic functions, complex integration, Cauchy's theorem, Taylor and Laurent series, theory of residues, argument and maximum principles, conformal mapping. Prerequisite: Mathematics 63 or 74. One course. *Staff*

187. Introduction to Mathematical Logic. Propositional calculus, predicate calculus. Godel completeness theorem, applications to formal number theory, incompleteness theorem, additional topics in proof theory or computability. Prerequisites: Mathematics 63 or 68, or 74, or Philosophy 103. One course. *Henson*

189. Introduction to Stochastic Processes. Elementary theory and application of stochastic process models; Poisson processes, counting processes, discrete parameter Markov chains. Prerequisite: Mathematics 135. One course. *Wilkinson*

191, 192. Independent Study. Directed reading and research. Open to highly qualified juniors and seniors. Two courses. *Staff*

197S. Seminar in Mathematics. Primarily intended for juniors and seniors majoring in mathematics. Content of course determined by instructor. Prerequisite: Mathematics 74. One course. *Staff*

For Seniors and Graduates

204. Geometry for Teachers. Metric and synthetic approaches to plane and solid geometry; affine geometry, and an algebraic model of Euclidean geometry. One course. *Staff*

207, 208. Introduction to Algebraic Structures. Groups, rings, fields; isomorphism theorems; partial and total orderings; characterizations of basic number systems; permutation groups; finitely generated Abelian groups; polynomial rings; principal ideal domains; division and Euclidean algorithms; vector spaces; linear transformations and matrices; bilinear forms; multilinear algebra; determinants; finite dimensional inner product spaces. Prerequisites: Mathematics 68 or 73 for 207; and 207 for 208. Two courses. *Staff*

217, 218. Intermediate Analysis. Real and complex number systems, sequences and series, continuity, differentiation, integration. Prerequisites: Mathematics 63 or 74 for 217; and 217 for 218. Two courses. *Staff*

221, 222. Numerical Analysis. For a description of these courses, see Computer Science 221, 222. Two courses. *Patrick*

227, 228. Theory of Numbers. Congruences, arithmetic functions, compound moduli, quadratic reciprocity, Gauss sums, quadratic forms, sums of squares. Prerequisites: Mathematics 63 or 74 for 227; and 227 for 228. Two courses. *Carlitz*

229, 230. Algebraic Numbers. Ideals, unique factorization, divisors of the discriminant, determination of the class number. Prerequisites: Mathematics 207 for 229; and 229 for 230. Two courses. *Carlitz*

234. Sample Designs. Methods of constructing and analyzing survey designs; elements of simple random sampling, stratified sampling, multistage sampling; methods of estimation; questionnaire construction; refusals and not-at-homes. Prerequisite: Mathematics 133. One course. *Staff*

235, 236. Algebra. Elementary categorical algebra; groups with operators, G-sets, structure groups; commutative algebra; principal ring modules; structure of rings and modules; field theory. Prerequisites: Mathematics 208 or equivalent for 235; and 235 for 236. Two courses. *Staff*

244. Design of Experiments. Methods of constructing and analyzing designs for experimental investigation, Latin square, split-plot, simple and partially confounded factorial designs, incomplete block designs, treatment of missing data, techniques of experimentation. Prerequisite: Mathematics 133. One course. *Burdick*

245, 246. Combinatorial Analysis. Generating functions, distributions, partitions, compositions, trees, and networks. Prerequisite: calculus. Two courses. *Carlitz*

247, 248. Arithmetic of Polynomials. Field theory, detailed study of finite fields, special polynomials and functions, valuation theory, the zeta function. Pre-

requisites: Mathematics 207 or consent of the instructor for 247; and 247 for 248. Two courses. *Carlitz*

262. Non-Parametric Statistics. A study of statistical tests in which no assumption about the underlying distribution is made; single and multiple sample tests for nominal and ordinal scales; non-parametric measures of correlation, efficiency of tests. Prerequisite: Mathematics 244 or consent of the instructor. One course. *Staff*

265, 266. Homological Algebra and its Applications. Categorical algebra; derived categories and homology; sheaves and their cohomology; applications to smooth manifolds and to complex manifolds; preschemes and schemes and their local cohomology. Prerequisites: Mathematics 236 and 271 or consent of instructor. Two courses. *Weisfeld*

271, 272. Introductory Topology. Basic topological properties, including separation axioms, compactness, and connectedness; metric spaces; product spaces; function spaces; uniform spaces. Prerequisite: calculus. Two courses. *Staff*

273, 274. Algebraic Topology. Homology and cohomology theories; complexes; introduction to homotopy groups, Čech homology theory. Prerequisite: Mathematics 272. Two courses. *Kraines*

275, 276. Probability. Foundations of probability; random variables; distributions; central limit problem; law of large numbers; limit and ergodic theorems. Prerequisite: Mathematics 135; or calculus and consent of the instructor. Two courses. *Staff*

283. Applied Mathematical Statistics. Basic probability concepts, the sample space, discrete and continuous events, permutations and combinations, conditional and marginal probability, discrete and continuous distributions, expected values and moments, sampling distributions, estimation, hypothesis testing, confidence intervals, basic queuing theory. Prerequisite: Mathematics 63 or 74. One course. *Herr*

284. Least Squares Analysis of Linear Models. General linear models; geometrical interpretations; multiple regression; one-way and multi-way analysis of variance; fixed, random, and mixed models; experimental design models; analysis of covariance; introduction to non-linear models. Prerequisite: Mathematics 136 or 283. One course. *Burdick*

285. Applied Mathematical Methods I. Vectors, line and surface integrals, tensors, complex variables, differential and integral equations. Prerequisite: Mathematics 63 or 74. One course. *Dressel*

286. Applied Mathematical Methods II. Wave equation, Fourier series, heat equation, telegraphic equations, Legendre polynomials, Bessel functions, Schrödinger's equation. Prerequisite: Mathematics 63 or 74. One course. *Dressel*

287, 288. Foundations of Mathematics. Propositional calculus, predicate calculus, axiomatized number theory. Gödel completeness and incompleteness theorems. Recursive functions; hierarchies; constructive ordinals. Set theory; consistency of the axiom of choice. Prerequisite: Mathematics 208 or Philosophy 103, or consent of the instructor. Two courses. *Staff*

290. Stochastic Processes. Foundations and probabilistic structure of stochastic processes; sample function properties, processes with finite second-order moments, stationary processes; representations. Prerequisite: Mathematics 275. One course. *Wilkinson*

291, 292. Analysis I, II. Theory of Analytic Functions, measure and integration theory, introduction to functional analysis. Prerequisite: Mathematics 218 or 140, consent of the instructor. Two courses. *Scoville*

293. Multivariate Statistics. Basic multinormal distribution theory, the multivariate general linear model including the use of Hotelling's T^2 statistic and the Roy union-intersection principle, principal components, canonical analysis, and factor analysis. Prerequisite: Mathematics 284, or consent of the instructor. One course. *O'Fallon*

295. Mathematical Foundations of Statistical Inference. Inference-theoretic approach to hypothesis testing, decision making, and estimation; Neyman-Pearson fundamental lemma; uniformly most powerful tests; Fisher's information and sufficiency; invariance and unbiasedness. Prerequisite: Mathematics 275, or consent of the instructor. One course. *Herr*

297, 298. Axiomatic Set Theory. Statement and development of Zermelo-Fraenkel axioms. Consistency and independence problems. New axioms and their consequences. Prerequisite: consent of the instructor. Two courses. *Shoenfield*

DEPARTMENTAL MAJOR

The A.B. degree

Prerequisites. Mathematics 31, 32.

Major Requirements. Mathematics 73, 74, and six courses in mathematics numbered above 100 (excluding Mathematics 133, 244) which must include one of the following year sequences: Mathematics 139, 140; Mathematics 207, 208; or Mathematics 217, 218.

It is recommended that all majors take a one year sequence in a natural science other than mathematics. For a student considering graduate study in mathematics, a reading knowledge of two foreign languages (usually either French, German, or Russian) is extremely desirable.

Medicine, School of—Basic Science Courses Open to Undergraduates

An undergraduate student in arts and sciences may select courses from the following offered by graduate departments associated with the School of Medicine, providing he has adequate preparation. For courses that are listed but not described below, see the *Bulletin of the Graduate School* for descriptions. If no prerequisites are listed, permission of the instructor is required. A major is not offered to undergraduates in any of the departments listed below.

For permission to work on courses listed below, and for further information, see Assistant Professor Cartmill, consultant for Anatomy; Assistant Professor Richardson, consultant for Biochemistry; Assistant Professor Luftig, consultant for Microbiology and Immunology; and Assistant Professor Gutknecht, consultant for Physiology and Pharmacology.

ANATOMY

151. Anatomy of the Lower Extremities as It Relates to Locomotion. Dissection of the human adult lower extremity. Demonstration and discussion of gait, biomechanics, and kinesiology. One course. *Bassett*

210. Introduction to the Human Structure. One or two courses by arrangement. *Shafland*

231. Human Evolution I. (Listed also as Zoology 131 and Anthropology 231.) Prerequisite: a course in biology or consent of instructor(s). One course. *Buettner-Janusch and Cartmill*

232. Human Evolution II. (Listed also as Zoology 132 and Anthropology 232.) Prerequisite: Anatomy 231 (Anthropology 231, Zoology 131) a course in genetics, or consent of instructor. One course. *Buettner-Janusch*

236. Human Genetics. (Listed also as Zoology 236 and Anthropology 236.) Prerequisites: Anatomy 231 (Anthropology 231, Zoology 131), or an elementary course in biology including genetics, or permission of instructor. One course. *Buettner-Janusch*

264. Mammalian Embryology and Developmental Anatomy. Prerequisites: one year of zoology and consent of instructor. One course. *Duke*

280. Molecular Basis of Anatomy. Prerequisites: microscopic anatomy or cytology (or equivalent) and permission of instructor. One course. *Adelman, Erickson, Longley, Moses, Reedy, and Robertson*

The following courses in anatomy are also available and are described in the *Bulletin of the Graduate School*. Full courses: 233-234, 271, 286, 288, 290, 291. Half-courses: 244, 261, 263. Half to full course by arrangement: 284.

BIOCHEMISTRY

209-210. Independent Study. A tutorial, based upon a laboratory or library project in biochemistry. One or two courses by arrangement. *Staff*

216. Molecular Genetics. Prerequisites: introductory courses in biochemistry and genetics. One course. *Guild and Staff*

247. Introductory Biochemistry. Prerequisites: Chemistry 151, one year of college physics (second semester may be concurrent), Mathematics 32, or consent of the instructors. (Listed also as Zoology 248.) One course. *Tanford and Staff*

276. Comparative and Evolutionary Biochemistry. (Listed also as Zoology 276.) Two courses. *Sullivan*

280. Biochemistry of Development. (Listed also as Microbiology 251.) Half-course. *Harris, Joklik, McCarty, and Turkington*

293. Macromolecules. Prerequisites: physical chemistry equivalent to Chemistry 161-162. One course. *Hill and Tanford*

295. Enzyme Mechanisms. Half-course. *Fridovich and Rajagopalan*

297. Intermediary Metabolism. One course. *Kirshner and Siegel*

298. Regulation of Cellular Metabolism. Prerequisites: Biochemistry 295,
297. Half-course. *Greene and Staff*

The following courses in biochemistry are also available and are described in the *Bulletin of the Graduate School*. Full courses: 204, 219, 222, 294. Half-courses: 208, 282, 284, 288, 290, 296.

MICROBIOLOGY AND IMMUNOLOGY

215. Bacteriophage: Structure and Function. Half-course. *Luftig and Nichols*

252. Virology. Half-course. *Joklik and Zweerink*

281. Bacterial Physiology I. One course. *Wheat and Willett*

282. Bacterial Physiology II. One course. *Burns and Vanaman*

291-292. Immunology I and II. Two courses. *Staff*

PHYSIOLOGY AND PHARMACOLOGY

200. Physiology of Man. Two courses. *Staff*

208. Respiratory System in Health and Disease. Half-course. *Kylstra, Saltzman, and Salzano*

209. Neuronal Physiology and Pharmacology. One course. *Narahashi and Staff*

212. Marine Membrane Physiology. Given at Beaufort. Two courses. *Gutknecht, Schoffeniels, Wachtel, and Staff*

213. Cellular and Chemical Pharmacology. One course. *Ottolenghi and Staff*

215. Topics in Developmental Physiology and Pharmacology. Half-course. *Lieberman, Mendell, and Padilla*

216. Contractile Processes in Physiology and Pharmacology. One course. *Anderson, Jobsis, and Johnson*

217. Membrane Transport Processes in Physiology and Pharmacology. Half-course. *Gunn, Gutknecht, Kirk, Lauf, McManus, and Tosteson*

The following courses in physiology and pharmacology are also available and are described in the *Bulletin of the Graduate School*. Full courses: 201, 210-211. Half-courses: 279, 280. Two-course weight: 200.

Medieval and Renaissance Studies Program

For a description of the program and the major, see page 28.

Music

Professor J. Mueller, *Chairman*; Assistant Professor L. DiCecco, *Director of Under-*

graduate Studies; Associate Professor P. Bryan, *Supervisor of Freshman Instruction*; Professors Bone, Hamilton, and Hanks; Associate Professors Earls, Kirken-dale, Saville, and Withers; Resident Artist Ciompi; Assistant Professors Bullock, Henry, and Smith; Visiting Assistant Professor Oliver; Staff Associates A. DiCecco, Frank, McCall, Phelps, Redding, and Ritchie

THEORY AND COMPOSITION

1. Rudimentary Skills. Designed for students wishing to learn reading of music, beginning rhythms, keys, scales, intervals, and triads. No credit given.

7-8. Dictation and Sight-Singing. Techniques of aural analysis and develop-ment of sight-reading skills. Music majors should take this course concurrently with Music 65-66. Skill course. Prerequisite: Music 1. Half-course each semester.

65. Fundamentals of Music Theory. Physical properties of sound; prin-ciples of diatonic tonal organization; melodic and harmonic constructions; elemen-tary counterpoint and figured bass. Skill course. Prerequisite: Music 1 or equivalent by examination. Music majors should take Music 7 concurrently. One course. *Oliver and Frank*

66. Tonal Harmony. Harmonic language of eighteenth and nineteenth century classicism; functional chromatism, sectional forms. Music majors should take Music 8 concurrently. Prerequisites: Music 65 and 7. One course. *Oliver and Frank*

67S, 68S. Composition I. Composing original music in the smaller forms for voice, piano, and other instruments. Studies in contemporary compositional techniques. Prerequisite: Music 15 or 76 or consent of instructor. Two courses. *Hamilton and Oliver*

107-108. Keyboard Theory. Harmonic principles of tonal music applied to the keyboard; score reading, figures bass, melodic harmonization, modulation, transposition. Music majors should take this concurrently with Music 115-116. Skill course. Prerequisites: Music 65-66, 7-8, and keyboard proficiency. Half-course each semester. *Frank*

115. Modal Counterpoint. Polyphonic, contrapuntal, and melodic prac-tices found in the sacred and secular works of the sixteenth and seventeenth cen-turies. Music majors should take Music 107 concurrently. Prerequisite: Music 65-66. One course. *Oliver*

116S. Linear Tonal Practice. Organic tonal elements (including canon, invention, chorale prelude, fugue) as found in the works of Bach, Mozart, Haydn, Beethoven, and Brahms. Prerequisite: Music 76, 77. One course. *Oliver*

117S, 118S. Music Theory III: Composition and Analysis. The develop-ment of technical and expressive means in various media and styles. The comple-tion of an original work in an instrumental or choral medium. Prerequisite: Music 116, 139, 158, or consent of instructor. Two courses. *Hamilton and Oliver*

122. Orchestration. The technical characteristics and transpositions of the instruments of the modern symphony orchestra and concert band. Instrumentation of piano scores of original compositions for string, woodwind, and brass ensem-bles. Prerequisite: Music 116. One course. *Bryan*

HISTORY AND LITERATURE

51-52. Introduction to Music Literature. The literature of music of Western civilization; acquisition of critical insights into musical styles, forms, and techniques. Representative works of major composers in all media, instrumental and vocal. Two courses. *Staff*

51P-52P. Preceptorial. Elective preceptorial for students enrolled in Music 51-52. *Staff*

125. Masterworks of Music Literature. An intensive study of selected masterworks which represent the principal currents in modern music history. Compositions by Bach, Mozart, Beethoven, Brahms, Debussy, and Bartok will constitute a frame of reference for historical, biographical, and stylistic analysis. One course. *Bone, DiCecco, and Mueller*

139. Twentieth-Century Music. Influential creative stylistic developments in music of the present century. A critical survey of works by Bartok, Berg, Schonberg, Stravinsky, and Webern as a means of establishing a relative standard of values for subsequent independent exploration. Prerequisite: a one-year course in music theory or literature, or consent of the instructor. One course. *Bullock*

156S. Music History I: History of Music from 1600 to 1750. Prerequisite: Music 5-6, 15, or consent of instructor. One course. *Saville*

157S. Music History II: History of Music from 1750 to 1830. Prerequisite: Music 5-6, 15, or consent of instructor. One course. *Bryan*

158S. Music History III: History of Music from 1830-1910. Prerequisite: Music 5-6, 15, or consent of instructor. One course. *Mueller*

159S. Music History IV: History of Music to 1600. Prerequisite: Music 5-6, 15 and two courses in music history, or consent of the instructor. One course. *Kirkendale*

163. Music in the Eighteenth Century. The development of important instrumental and vocal media and formal concepts through study of the music, the musicians, and their environment. One course. *Bryan*

164. Music in the Nineteenth Century. The interaction of musical, artistic, and literary movements in the cultural life of the century. One course. *Mueller*

165. Opera Literature. From the Florentine Camerata to the present. The operatic idea, with attention to changing relationships of music and text; opera as social commentary; formal and stylistic means. Selected composers from Monteverdi to Berg. One course. *Saville*

166S. The Renaissance Madrigal. History of Italian and English madrigal forms from the fourteenth century Ars Nova through the Renaissance into the early Baroque of the 1620's. Ability to read music and some experience with Italian helpful but not required. One course. *Saville*

173. World Music. Musical cultures of the world, emphasis on non-Western music, especially the art music of the Far East, Southeast Asia, the Near and Middle East; folk music of selected areas. One course. *Earls*

INDEPENDENT STUDY AND SEMINARS

Admission to these courses will be subject to approval of the Director of Undergraduate Studies of the Department of Music and the individual instructor. The instructor as well as the course content will be established in accordance with the individual student's interests and capacities.

The department offers work leading to Graduation with Distinction. See the section on Academic Honors on page 43.

181, 182. Independent Study in Musical Performance.* Open only to juniors possessing an exceptional technical and interpretive command of a musical medium. Prerequisite: Music 47, 48, 97, 98 or equivalent; audition and permission of instructor. One or two courses. *Staff*

183, 184. Independent Study in Musical Performance.* Same as 181, 182, but for seniors. One or two courses. *Staff*

185S, 186S. Seminar in Music. Guidance in the sources and materials of music and in the methods of stylistic analysis and criticism. A background of historical, stylistic, and theoretical knowledge is essential. Formal papers required. Two courses. *Staff*

191, 192. Independent Study. Directed reading, research, and musical analysis within a prescribed area of musical literature. Open only to highly qualified students in the junior year, by permission of the department. One or two courses. *Staff*

193, 194. Independent Study. Same as 191, 192, but for seniors. One or two courses. *Staff*

195S, 196S. Seminar in Music. Same as 185S, 186S but for seniors, not necessarily restricted to candidates for degree with distinction. Two courses. *Staff*

MUSIC EDUCATION AND PEDAGOGY

57-58. Vocal Diction. Problems of diction as specifically applied to the art of singing. Required of all applied voice majors. Half-course for two semesters work. *Hanks*

121. Conducting. The conducting of orchestral and vocal scores. Score-reading and analysis, principles of interpretation, establishment of vocal and instrumental conductoral techniques leading to practical experience in conducting the department musical organizations in rehearsal. Prerequisite: Music 76, 77, 116, or consent of instructor. One course. *Bone*

151. Public School Music Education (Elementary). Development of the child through music. Child voice and song literature; rhythmic activities; learning to listen; use of elementary instruments such as the autoharp, psaltery, bells, rhythm band instruments. Both group and individual help in elementary music theory; music reading exercises; chording and improvising piano accompaniments; conducting; construction of rhythm band scores. Integration of music with other activities, such as planning music for social studies units. Half-course. *McCall*

*The schedule of fees for private lessons as published on page 163 is applicable to courses 181, 182, 183, 184.

152. Public School Music Literature (Elementary). A study and analysis of key works in the symphonic, pianistic, and vocal repertoire which are particularly applicable to the teaching of music appreciation as a cultural aspect of social studies in the public school. Half-course. *McCall*

153. Vocal Music in the Public School (Secondary). Repertoire and methods for teaching vocal music in the junior and senior high schools. Aims, organization, administration, training, and performance of school choirs and ensembles; care of the changing voice. One course. *Saville*

154. Instrumental Music in the Public School (Secondary). Materials and methods of teaching instrumental music in the junior and senior high schools; emphasis on teaching techniques, repertoire, organization, and administration of the instrumental curriculum. One course. *Bone*

APPLIED MUSIC

The study of applied music concerns the understanding of music literature through performance. Instruction is offered in the following media: (a) piano; (b) strings; (c) woodwinds; (d) brass; (e) voice; (f) ensemble—instrumental, piano, vocal coaching and performances participation through one of the departmental ensembles listed at close of the music section; and (g) organ. Instruction in media *a* through *e* may be private or in classes limited to a minimum of four and a maximum of seven students. Class instruction is restricted to the first four grades of proficiency. Class instruction shall be designated by adding the letter *x* to the appropriate medium and year-in-school classification. (Example: junior year, Woodwinds, class instruction is recorded 147CX.)

Students must arrange an audition with the instructor prior to registration in applied music courses. The course numbers listed below refer to the student's class standing and not his musical proficiency.

Piano. 47A-48A, 97A-98A, 147A-148A, 197A-198A. Half-course or one course per year. *Withers, Phelps, and Talbott*

Violin, Viola, Cello. 47B-48B, 97B-98B, 147B-148B, 197B-198B. Half-course or one course per year. *Ciampi, DiCecco, and J. Mueller*

Woodwinds. 47C-48C, 97C-98C, 147C-148C, 197C-198C. Half-course or one course per year. *Henry*

Brass. 47D-48D, 97D-98D, 147D-148D, 197D-198D. Half-course or one course per year. *Bryan*

Voice. 47E-48E, 97E-98E, 147E-148E, 197E-198E. Half-course or one course per year. *Hanks and Redding*

Ensemble. 47F-48F, 97F-98F, 147F-148F, 197F-198F. Half-course per year. *Staff*

Organ. 47G-48G, 97G-98G, 147G-148G, 197G-198G. Half-course or one course per year. *Ritchie*

Credit in Applied Music. (Skill courses—credit not applicable to distributional requirements.) Credit for instruction in media *A*, *B*, *C*, *D*, *E*, and *G* is granted on the basis of a half-course per semester for one hour of private instruction per week and a minimum of six hours practice weekly; or a half-course per

year for one-half hour of private instruction, or one period of class study, and a minimum of six hours practice per week. An additional weekly class meeting for performance and criticism may be required by the instructor without additional credit. Credit for instruction in medium *F* is granted on the basis of a half-course per year for one rehearsal period of instruction and a minimum of three hours practice per week.

Fees. Upperclass students who have been accepted as music majors at the time of registration for applied music courses are exempt from paying the applied music fees. Other students are charged for all applied music media except *F* (Ensemble).

Fees are payable to the Bursar's Office of Duke University upon notification from that office at the beginning of each semester as follows:

One 1/2 hour private lesson per week for one semester	\$ 60.00
Two 1/2 hour private lessons per week or one 1-hour private lesson per week for one semester	100.00
One 1-hour class lesson per week for one semester	25.00

All students registered for applied music instruction are charged for practice room facilities—students having practice facilities off campus *must* notify the departmental office of this fact by the end of the third week of *each* semester; otherwise they will be automatically billed as follows:

Medium A. Piano	
Medium E. Voice	\$20.00 per semester (room with piano or organ)
Medium G. Organ	
Medium B. Strings	
Medium C. Woodwinds	\$15.00 per semester (room without piano)
Medium D. Brass	
Medium F. Ensemble	No practice room fee is charged

DEPARTMENTAL MAJOR

Prerequisites. Music 7-8, 107-108, 65, 66, and one year of applied music study in instrument or voice. Any or all of these may be exempted through demonstration of proficiency by examination and/or audition.

Major Requirements. Music 115, 116, 156, 157, 158, 159, and one additional elective course in the department.

DEPARTMENTAL ORGANIZATIONS

- Concert Band
- Symphony Orchestra
- Marching Band
- Chancel Singers
- Duke University Chorale

DEPARTMENTAL ENSEMBLES

- Brass Ensemble
- Chamber Orchestra
- Madrigal Singers

Piano Ensemble (may be in combination with Instruments or Voice)
String Ensemble (Sonata, Trio, or Quartet)
Vocal Ensemble (Opera Workshop)
Woodwind Quintet

Philosophy

Professor Welsh, *Chairman*; Assistant Professor Aquila, *Director of Undergraduate Studies*; Professors Negley and Peach; Associate Professors Mahoney, Roberts, and Sanford; Assistant Professors Coder and Kalke; Instructors Benditt and Ashley

The undergraduate program in the Department of Philosophy is designed to acquaint students with the content and the structure of philosophical theory in various areas. Discussion is encouraged so that the student can engage actively in the philosophical examination of problems.

Course offerings fall into two general categories: the systematic and the historical. In a systematic treatment, the organization of a course is primarily in terms of the problems presented by the subject matter of that course, as in logic, ethics, and metaphysics. In historical courses, attention is directed more to the order of development in the thought of a particular philosopher (Plato, Aristotle, Kant), or in a historical period. In all courses, reading of the works of philosophers will acquaint the students with the important and influential contributions to the definition and solution of philosophical issues.

The problems raised in philosophy in respect to the various fields of the arts and sciences involve questions which are not normally given attention in those particular disciplines. In the consideration of such problems, therefore, it is expected that the student will acquire some understanding and perspective of the major areas of man's intellectual endeavor. In this sense, philosophical comprehension is an essential part of a student's learning and education.

Only one of 41, 42, 43S, or 44S may be taken for credit. Not open to juniors and seniors.

41. Introduction to Philosophy. Examination of problems in philosophy; emphasis on metaphysics and theory of knowledge. One course. *Staff*

42. Introduction to Philosophy. Examination of problems in philosophy; emphasis on ethics and value theory. One course. *Staff*

43S. Introduction to Philosophy. Philosophy 41 conducted as a seminar. One course. *Staff*

44S. Introduction to Philosophy. Philosophy 42 conducted as a seminar. One course. *Staff*

48. Logic. A study of the conditions of effective thinking and clear communication. Examination of the basic principles of deductive reasoning. One course. *Coder, Kalke, and Sanford*

93. History of Ancient Philosophy. The Pre-Socratics, Socrates, Plato, Aristotle, and post-Aristotelian systems. Freshman prerequisite: previous philosophy course and permission of instructor. One course. *Mahoney and Sanford*

94. History of Modern Philosophy. Bacon, Hobbes, Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. Freshman prerequisite: previous phil-

osophy course and permission of instructor. One course. *Aquila, Peach, and Roberts*

101. Philosophy of Religion. Selected concepts and doctrines. One course. *Roberts*

102. Aesthetics: The Philosophy of Art. The concept of beauty, the work of art, the function of art, art and society, the analysis of a work of art, criticism in the arts. One course. *Welsh*

103. Symbolic Logic. Detailed analysis of deduction and of deductive systems. Open to sophomores by permission of instructor. One course. *Coder*

104. Philosophy of Science. The principal philosophical and methodological problems in contemporary science. One course. *Kalke*

106. Philosophy of Law. Natural law theory; legal positivism; legal realism; the relation of law and morality. One course. *Benditt*

107. Political and Social Philosophy. Discussion of the fundamental principles of political and social organizations, with particular attention to democratic philosophy, corporate theory, and Marxist-Soviet philosophy. One course. *Negley*

108. Social Ideals and Utopias. Reading of selected Utopias; analysis of the value-structures and political principles of these ideal societies. One course. *Negley*

109. Philosophy of Language. A philosophical analysis of problems arising in the study of language and symbolism. Topics include: theories of language, the nature of signs and symbols, theories of meaning, types of discourse (scientific, mathematical, poetic), definition, ambiguity, metaphor. One course. *Welsh*

110. Epistemology. A treatment of the problems of truth and knowledge; of a priori and empirical statements; and of theories of perception and probability. One course. *Sanford and Coder*

111. Metaphysics. A selection from the following: theories of substance, universals, identity, space, time, and causality; determinism and action; the relation of mind and body. Prerequisite: one course in philosophy. One course. *Sanford*

112. Philosophy of Mind. Such topics as mind and body, thought, perception, persons, and personal identity. One course. *Aquila*

116. Systematic Ethics. Problems in moral philosophy: the nature of morality, ethical relativism, egoism, utilitarianism. Both historical and contemporary readings, with emphasis on the latter. One course. *Benditt*

117. Ancient and Modern Ethical Theories. The development of ethical thought in the West; the interaction between culture and ethical theory, with special reference to the Greek city-state, Roman law, the Renaissance, the Reformation, and the rise of modern science. Readings in the great ethical philosophers. One course. *Welsh*

119. Introduction to Medieval Philosophy. Development of philosophy from late antiquity to the fourteenth century. Topics will include Augustine, Avicenna, Averroes, Ibn Gabirol, Maimonides, Albert the Great, Aquinas, Scotus, Occam, and Latin Averroism. One course. *Mahoney*

132. Nineteenth-Century Philosophy. Major nineteenth-century philosophers; emphasis on the German tradition: Hegel, Schopenhauer, and Nietzsche. One course. *Aquila*

134. Existentialism. One or more major texts, such as Sartre's *Being and Nothingness*. One course. *Aquila*

191, 192, 193, 194. Independent Study. Directed reading and research. Open only to highly qualified students in the junior and senior years, by permission of the department. *Staff*

196S, 197S, 198S, 199S. Seminars in Philosophy. Prerequisite: one course in philosophy or consent of instructor. One course each. *Staff*

For Seniors and Graduates

202. Aesthetics: The Philosophy of Art. A study of some fundamental issues in aesthetics with particular reference to the fields of literature, music, and painting. Problems discussed include the role of standards in criticism, aesthetic judgment, interpretation, and evaluation in the arts, meaning in the arts, art and truth, the arts and morality. Open to juniors with the approval of the instructor. One course. *Welsh*

203. Contemporary Ethical Theories. Study of the nature and justification of basic ethical concepts in the light of the chief ethical theories of twentieth century British and American philosophers. One course. *Benditt*

204. Philosophy of Law. Natural law theory and positivism; the idea of obligation (legal, political, social, moral); and the relation of law and morality. One course. *Benditt*

205. The Philosophy of History. Discussion of the method, metaphysical implications, and influence of interpretations of history; Hegel, Marx, Spengler, Toynbee. One course. *Negley*

208. Political Values. Analysis of the systematic justification of political principles and the political values in the administration of law. One course. *Negley*

211. Plato. A critical study of selected dialogues, with emphasis on problems in epistemology and metaphysics. One course. *Mahoney*

217. Aristotle. A study of passages from the *Organon*, *Physics*, *De Anima*, and *Metaphysics*. One course. *Mahoney*

218. Medieval Philosophy. Selected problems in medieval philosophy. One course. *Mahoney*

219. Kant's Moral Philosophy.* One course. *Negley*

225. British Empiricism. A critical study of the writings of Locke, Berkeley, or Hume with special emphasis on problems in the theory of knowledge. One course. *Peach*

227. Continental Rationalism. A critical study of the writings of Descar-

*Offered on demand.

tes, Spinoza, or Leibniz with special emphasis on problems in the theory of knowledge and metaphysics. (1972-3: Descartes.) One course. *Peach*

228. Recent and Contemporary Philosophy. A critical study of some contemporary movements in philosophy with special emphasis on the work of Moore, Russell, Wittgenstein, Wisdom, and Ryle. One course. *Welsh*

229. American Pragmatism.* Studies in the philosophy of Pierce, James, Dewey, and Mead. One course. *Welsh*

231. Classical German Philosophy. Selected topics in eighteenth and nineteenth century German philosophy. One course. *Aquila*

232. Recent Continental Philosophy. Selected topics. One course. *Aquila*

233. Methodology of the Empirical Sciences. Recent philosophical discussion of the concept of a scientific explanation, the nature of laws, theory and observation, and other topics. Approval of instructor required for undergraduates and students from departments other than philosophy. One course.

234. Problems in the Philosophy of Science. Selected problems in the physical and non-physical sciences: space and time, measurement, probability and induction, and the philosophy of the behavioral and social sciences. Approval of instructor required for undergraduates and for graduate students in departments other than philosophy. One course. *Roberts*

241. Symbolic Logic. Detailed analysis of deduction and of deductive systems. One course. *Coder*

251. Epistemology. Selected topics in the theory of knowledge, e.g., conditions of knowledge, scepticism, and certainty, perception, memory, knowledge of other minds, and knowledge of necessary truths. One course. *Sanford*

252. Metaphysics. Selected topics: substance, qualities and universals, identity, space, time, causation, and determinism. One course. *Sanford*

253. Philosophy of Mind. Analysis of concepts such as thought and belief; issues such as mind-body relations, thought and action, the nature of persons and personal identity. One course. *Aquila and Coder*

260. Wittgenstein. An examination of the *Tractatus*, or the *Investigations*. One course. *Welsh*

291, 292. Critical Philosophy. The analysis of basic philosophical concepts and beliefs with a view to critical evaluation and constructive emendation of them. Emphasis on the practice as well as the principles of philosophical criticism and problem solving. Enrollment only by permission of the department; Philosophy 291 is ordinarily prerequisite for 292. One course each semester. *Graduate Staff*

DEPARTMENTAL MAJOR

Prerequisites. Philosophy 48 (Logic) is recommended for all those intending to major in philosophy. Philosophy 41 or 42 is ordinarily a prerequisite to major work.

*Offered on demand.

Major Requirements. Eight semester courses in philosophy of which at least six must be in courses numbered above 48. The following must be included: Philosophy 93 and 94; one non-introductory course in theory of value.

Related Work. Two courses minimum in each of two departments approved by the philosophy adviser. Courses may not be those primarily open to freshmen. There is no restriction in principle as to departments in which related work may be taken, and the approval of the philosophy adviser is required only to ensure some coherence in the program of major and related work as a whole.

The department offers work leading to graduation with distinction. See the section on Honors.

Physics

Professor Fairbank, *Chairman*; Assistant Professor Rose, *Director of Undergraduate Studies*; Professor David W. Carpenter, *Supervisor of Freshman Instruction*; Professors Biedenharn, Bilpuch, Gordy, Greuling, Lewis, Meyer, Newson, Robinson, Robl, and Walker; Associate Professors Cusson, Evans, Fortney, Han, Holman, Roberson, and Walter; Assistant Professors Dwight W. Carpenter, DeLucia, Dzubay, Hayward, Riedel, and Sykes; Instructor Moses

1-2. Introductory Physics. This course traces historically and experimentally the development of the important principles of physics. Open to freshmen, sophomores, and juniors. Three lectures and one two-hour laboratory. Two courses. *Hayward*

41, 42. Fundamentals of Physics. For students interested in majoring in physics; taken in the freshman year. Basic principles of physics, mainly classical, at a level similar to Physics 51-52, but with emphasis on laying a foundation for further study. Three lecture-recitations and one three-hour laboratory. Prerequisites: approval of the department and Mathematics 31-32 or equivalent (may be taken concurrently). Two courses. *Rose*

51D-52D. General Physics. Basic principles of general physics treated more quantitatively than Physics 1-2. Designed for students entering medicine, engineering, and the sciences. Not open for credit to students who have completed Physics 1-2 or 41-42. Students planning to major in physics should enroll in Physics 41-42 in their freshman year. Three lecture-recitations and one three-hour laboratory period each week. Prerequisites: Mathematics 31, 32 or equivalent (may be taken concurrently with permission of instructor.) Two courses. *Bilpuch, Cusson, DeLucia, Fairbank, Fortney, Greuling, Lewis, Moses, Roberson, Robinson, and Walter*

161, 162. Modern Physics. Relativity, quantum phenomena, atomic and molecular structure and spectra, solids, statistical physics, nuclear physics, elementary particles. Prerequisites: Physics 41-42 or 51-52 and Mathematics 32; Physics 161 is prerequisite for 162. Two courses. *Evans and Han*

171. Electronics. A. C. circuits, transients, fundamentals of vacuum tubes and electron physics, basic electronic circuits. Three lectures and one three-hour laboratory. Prerequisites: Physics 41-42 or 51-52. One course. *Dzubay*

176. Thermodynamics and Kinetic Theory. Thermodynamics, kinetic theory, and elementary statistical mechanics. Prerequisites: Physics 41-42 or 51-52, and differential and integral calculus. One course. *Fairbank*

181-182. Classical Mechanics. Newtonian mechanics at the intermediate level. Motion of systems of particles and rigid bodies; conservation theorems; small oscillations; force problems and classical scattering. Prerequisites: Physics 41-42 or 51-52, and differential and integral calculus. Two courses. *Walker*

185. Optics and Spectroscopy. Wave motion; Fourier methods; geometrical and physical optics; coherence; lasers; atomic and molecular spectra. Prerequisites: Physics 41-42 or 51-52, and differential and integral calculus. One course.

187S, 188S. Topics in Modern Physics. A group tutorial on selected topics such as particle physics, general relativity, liquid helium, and superconductivity. Prerequisites: Physics 41-42 or 51-52, and differential and integral calculus. Two courses. *Cusson*

A course in general college physics and a course in differential and integral calculus are prerequisites to all courses numbered 200 and above.

209. Introduction to Solid State Physics. Basic physical processes in solids with emphasis on dielectrics, metals, and semiconductors; crystal structure, thermal and magnetic properties. One course.

215. Introduction to Quantum Mechanics. Wave-mechanics and elementary applications; the hydrogen-like atoms; electron spin and angular momentum; operators and eigenvalues; stationary state perturbation theory; identical particles. Prerequisites: Physics 162, 182 or equivalents; Mathematics 285-286 should be taken concurrently. One course. *Robl*

217S, 218S. Advanced Physics Laboratory and Seminar. Experiments involving the fields of mechanics, electricity, magnetism, heat, optics, and modern physics. Two courses. *Meyer and Dzubay*

220. Advanced Electronics. Vacuum tubes and solid state devices, advanced circuit analysis. Three lectures and one three-hour laboratory. One course. *Dzubay*

221, 222. Theoretical Physics. Mechanics of particles and of rigid bodies, elasticity, fluids dynamics, electrodynamics; optics, relativity, thermodynamics, statistical mechanics, wave mechanics. Prerequisite: Mathematics 285-286 or equivalent to be taken at least concurrently. Two courses.

223, 224. Electricity and Magnetism. Electrostatics, magnetostatics, and potential theory; dielectric and magnetic media; magnetic field of currents and law of induction; Maxwell's electrodynamics, theory of wave optics, refraction, interference and diffraction. Two courses. *Carpenter*

225, 226. Elementary Investigations. The aim of this course is to provide training in the laboratory and library methods of physical research. Properly qualified students may conduct elementary investigations under the supervision of a member of the staff. One course each semester. *Staff*

DEPARTMENTAL MAJOR

A student planning to major in physics should enroll in Physics 41-42 in his freshman year. He should also arrange to complete the necessary mathematics as soon as possible. A special section (denoted by an *X* in the course schedule) has been

arranged in Physics 161-162. This section is primarily for physics majors, and it is recommended that persons planning to major in physics should attempt to fit it into their schedules. Since Physics 1-2 is intended primarily for non-science majors, it is not recommended for physics majors.

The A.B. degree

Prerequisites. Physics 41-42 or 51D-52D or equivalent; Mathematics 31-32 or equivalent, 73, 74, or 131; Chemistry 1, 2 or 1, 42.

Major Requirements. At least eight semester-courses in physics from the available 100- and 200-level courses. Of these at least two courses must be laboratory courses. A physics major also normally takes two courses of related work beyond the introductory level, approved as a program by his physics adviser.

The B.S. degree

Prerequisites. Physics 41-42 or 51D-52D or equivalent; Mathematics 31-32 or equivalent, 73, 74, or 131; Chemistry 1, 2 or 1, 42.

Major Requirements. At least ten semester-courses in physics from the available 100- and 200-level courses. At least two of these must be laboratory courses. A B.S. physics major also normally takes three courses of related work beyond the introductory level, approved as a program by his physics adviser.

The department offers to the student in his senior year the possibility of being associated with research conducted in this institution. Such work may lead to graduation with distinction. See the section on Honors.

Political Science

Professor Braibanti, *Chairman*; Assistant Professor Spragens, *Director of Undergraduate Studies*; Professors Ball, Cole, Cook, Grzybowski, Hall, Hallowell, Kornberg, Kulski, Leach, and Simpson; Visiting Professor Hagan; Associate Professors Fish and Johns; Assistant Professors Eldridge, Paletz, and Trilling; Instructors Mook, Payne, and Valenzuela; Part-time Instructors Hines and Sykes

The objective of the Department of Political Science is to acquaint students with the theory and practice of government and politics at the local, state, national, and international levels. Although primary attention is focused upon the American political and administrative system, emphasis is also placed upon a comparative study of the political institutions and movements of thought peculiar to the nations of Europe, Latin America, Africa, and Southern Asia. The student's attention is also directed to the problems encountered in international organization, politics, and law. The development of political philosophy from Plato to the present day is an essential part of the department's course offerings. Methods of study include the empirical, the historical, the legal, the comparative, and the philosophical.

Directing its effort to an intelligent understanding of the contemporary world and of the responsibilities which are laid upon citizens of a democracy, the Department of Political Science shares the objectives of a liberal arts education. Although the department does not aim at vocational education, the knowledge it seeks to impart should be useful to anyone contemplating a career in law, government service, or politics.

Students intending to major in the department should take Political Science 61D or 61S. Ordinarily one of them must be taken before proceeding to more advanced work in the department. This rule may be waived with the consent of the Director of Undergraduate Studies.

The advanced courses are divided into four major groups. Majors are required to take at least one course in three of these groups.

Political Science 197 and 198 are designed to provide an opportunity for majors in the department to qualify for graduation with distinction.

INTRODUCTORY COURSES

61D. The American Political System. Theory and practice of American government and politics. Federal-state relations, the separation and interrelationships of the executive, legislative, and judicial branches of government, judicial review, the role of political parties and public opinion, the formulation and execution of domestic and foreign policy, civil liberties. One course. *Staff*

61S. The American Political System. A seminar version of 61D. Preference given to prospective majors. One course. *Staff*

Students planning to major in political science or students seeking to meet the social science requirement should follow Political Science 61D or 61S with a 100-level course of their choice. Sophomores may not register in courses numbered above 200.

POLITICAL THEORY AND METHODOLOGY

111S, 112S-113S. Administration of Justice. Three sequential courses, spring, summer (including internship) and fall, respectively. Permission of instructors required. *Pye and Staff*

114S, 115S-116S. Communications Policy. Three sequential courses, spring, summer (including internship) and fall, respectively. Permission of instructors required. *Lange, Paletz, and Patterson*

123. Introduction to Political Philosophy. The nature and enduring problems of political philosophy, illustrated by selected theorists in the Western political tradition. One course. *Spragens*

126. Democratic Theory and Political Reality. Normative goals and empirical analyses of existing democratic states. One course. *Spragens*

131. Introduction to American Political Thought. Basic elements in the American political tradition as developed from its English roots to the present. One course. *Cook*

132. Contemporary Political Ideologies. Communism, fascism, democracy, and other significant ideologies. One course. *Cook*

133. Policy Choice as Value Conflict. Admission by consent of instructor. One course. *Payne*

134S. Problems in Communication. Admission by consent of instructor. One course. *Patterson*

197S. Principles and Methods of Political Inquiry. Philosophical, scientific, and behavioristic approaches to political problems; contemporary conceptual frameworks, including systems analysis and functionalism, group theory, and mathematical models. Prerequisite: consent of the instructor. One course. *Trilling*

222. Empirical Theory. Critical examination of contemporary, non-normative conceptual frameworks for political inquiry, with emphasis on the qualifications of these frameworks as theories. One course. *Trilling*

223. Political Philosophy from Plato to Machiavelli. Intensive analysis of the political philosophies of Plato and Aristotle, a survey of medieval political thought and an analysis of the significance of Machiavelli. One course. *Hallowell*

224. Modern Political Theory. An historical survey and philosophical analysis of political theory from the beginning of the seventeenth to the middle of the nineteenth century. Attention is given to the rise of liberalism, the Age of Enlightenment, the romantic and conservative reaction, idealism, and utilitarianism. One course. *Hallowell*

229. Recent and Contemporary Political Theory. The rise of positivism and its impact upon modern political thought, the origins of socialism, Marxism and its variants, socialism in the Soviet Union, nationalism, Fascism and National Socialism, the crisis in modern democracy, Christianity, and the social order. One course. *Hallowell*

231. American Political Theory. An analysis of the main currents in American political thought from colonial beginnings to the present day, with emphasis upon the development of liberalism in America. One course. *Cook*

233. Research Methodology. Elements in research design; interdependence of theory and research. One course. *Trilling*

236. Statistical Analysis. An introduction to the descriptive and analytical uses of statistics in political research. Prerequisite: graduate standing or permission of instructor. One course. *Trilling*

249. Comparative Political Analysis and Political Development. General methodology of comparison of political systems. Institutional, structural, functional, and configurative modes of analysis. Theory of political development. Theoretical problems of induced political change. One course. *Braibanti*

COMPARATIVE GOVERNMENT AND POLITICS

101, 102. Introduction to the Civilizations of Southern Asia. (See Interdisciplinary Course 101, 102.)

117. Comparative Legal Systems. Origins, development, and mutual influences of modern legal systems: Roman and civil law; the Common Law and the Anglo-Saxon tradition; Islamic law; Communist legal systems and the legal systems of Black Africa. One course. *Grzybowski*

136. Comparative Government and Politics: Europe. The impact of social and economic change of European politics. Totalitarian vs. pluralistic models. Formal and informal political integration. Special attention to Great Britain, France, West and East Germany, the Soviet Union. One course. *Cole and Johns*

151. Comparative Government And Politics: Latin American I. Historical and cultural context of political institutions and behavior; the role of traditional and emerging groups and forces; political instability and the decision-making process. One course. *Valenzuela*

- 152. Comparative Government and Politics: Latin American II.** Analysis of the politics of major countries including Argentina, Brazil, Chile, Cuba, and Mexico. One course. *Valenzuela*
- 155. Problems of Political Development in the New States.** Survey of change and modernization in Africa and Asia; nationalism and neutralism, role of political parties, the military, and the bureaucracy in nation-building; economic growth and foreign aid. One course. *Braibanti*
- 161. Comparative Government and Politics: Africa.** Nationalism, nation-building, and problems of development in selected states of sub-Saharan Africa. One course. *Johns*
- 165. The Government and Politics of the U.S.S.R.** An analysis of the governmental institutions, party structure, and policies of the Soviet Union. Attention will be given to policies affecting the intelligentsia, workers, and peasants. One course. *Kulski*
- 166. Soviet Foreign Relations.** An analysis of relations between the Soviet Union and other states (Communist and non-Communist, Western, and under-developed) as well as of the relations between the Communist Party of the Soviet Union with Communist parties in other countries. One course. *Kulski*
- 180. Comparative Government and Politics: Southern Asia I.** Concepts of political development in new states, using India, Pakistan, Ceylon, and Malaya as case studies. Theory and practice of foreign aid and technical assistance as agents of political modernization. One course. *Braibanti*
- 181. Comparative Government and Politics: Southern Asia II.** The political modernization of India and Pakistan since 1947. Constitutional developments as revealed in leading court judgments will be studied. Other topics will be the ideology of administrative reform, formulation of state polity, rural development, and party politics. One course. *Braibanti*
- 182. Comparative Government and Politics: Japan.** Political change in modern Japan. State-building, democracy, political values, participation, and elite power. One course. *Mook*
- 214. Comparative Administrative Law.** Comparative analysis of the role of administrative techniques in established and transitional constitutional systems. French, German, British, and American patterns. Control of legality and expediency of various types of judicial review. One course. *Grzybowski*
- 225. Comparative Government and Politics: Western Europe.** Modern political institutions and processes in Western Europe. One course. *Cole*
- 235. The Commonwealth.** Analysis of political relationships among the members of the Commonwealth and a comparative study of the political systems of the Commonwealth countries, with emphasis on Canada. One course. *Cole*
- 250. Comparative Government and Politics: Southern Asia.** The political development of India and Pakistan. Contextual determinants of the political systems. Political consequences of partition. National integration, constitutional, and institutional aspects of the political systems. Impact of foreign technical assistance. One course. *Braibanti*

253. Comparative Government and Politics: Latin America. Current literature applicable to an understanding of the major themes of Latin American politics. One course. *Valenzuela*

271. Political Processes in Traditional and Modern Africa. (Also listed as History 219.) One course. *Hartwig and Johns*

277. Comparative Party Politics. The impact of social and political systems on party structures, functions, ideologies, and leadership recruitment. Emphasis upon research techniques and objectives. One course. *Kornberg*

280. Comparative Government and Politics: Sub-Saharan Africa. Particular attention will be given to traditionalism and modernization, ideologies, leadership, party systems, the adaptation of parliamentary institutions, Africanization of the civil services, and the problem of political integration. One course. *Johns*

AMERICAN GOVERNMENT AND PUBLIC ADMINISTRATION

100. The Politics of Civil Rights and Liberties in America. Development and purposes, emphasizing the diverse institutional and other forces that enlarge or constrict them. One course. *Fish*

105. The Black American in Politics. Behavior of black people in the American political system, with special attention to voting organizations and the black power movement. One course. *Payne*

108. The American Presidency. The presidency and its impact on the American political system. One course. *Paletz*

109. State and Local Government Today. Problems in state, county, and city government: administration of services such as education, public welfare, law enforcement, inter-governmental relationships, administrative reorganization, methods of popular control, and the reconstruction of state and local government to meet present-day needs. One course. *Leach*

125. American Political Parties and Practical Politics. A study of the historical development, organization, and methods of political parties in the United States. One course. *Simpson*

127. Law and Society. Nature and functions of law; Anglo-American legal institutions, the process of judicial decision-making, and the relationships among judges, lawyers, legislators, and administrators in the development of public as well as private law. One course. *Fish*

129. Groups in American Politics. Theory and practice of the interest group approach to the study of American politics. One course. *Paletz*

130. Politics and the Media of Mass Communication. Activities of the media of mass communication as they affect the American political system and process. Governmental impact on the mass media. One course. *Paletz*

137. Political Behavior in Elections. Political participation; public opinion; voting behavior, sociological and psychological bases, comparative studies, models and methodology of research. One course. *Trilling*

138. Political Behavior in Policy-Making. A study of the major factors that

come into play in the making of governmental policy decisions. Special attention will be paid to the role of pressure groups and the methods of their lobbyist representatives, to the effects of pressures from constituents, and to the pressures of the executive and legislative branches upon each other. One course.

139. Science and Government. The impact of science on governmental policies, processes, and institutions. The effect of government on science. One course.

141. Public Administration. An introduction to the role of administration in the governmental process considering principles of administrative organization, methods of administrative control, personnel, and fiscal management. In general the study of the organizational and administrative problems encountered by any government agency charged with carrying out a public policy. One course. *Hall*

142. Administrative Responsibility. An evaluation of political, legal, and administrative methods of achieving a responsible bureaucracy in American national government. Comparisons with relevant experience and techniques in other countries such as Great Britain and France. One course. *Hall*

143. The Politics of Distribution. Governmental policies in areas such as education, housing, health, and welfare to which significant allocations of resources have recently been made. One course.

146. Legislation. A study of the composition and structures of legislative bodies and of the legislative process with attention to procedure, methods, techniques, delegation of discretion, and the use of controls. One course. *Simpson*

164. Government Regulatory Policy and Administration. Regulatory policies of the U.S. government; administrative procedures and organizations designed to implement those policies. One course.

167S. Ecology and Social Action. (See Interdisciplinary Course 167S.)

170S. The Legal Process and Social Change. The role of the legal system in effecting and mediating social change. Consideration of different strategies and the circumstances in which they are effective. One course. *Fleishman*

174. Political Implications of Economic Legislation. A study of political and sectional alignments in the passage of tariff, farm, railway, New Deal, and other economic legislation. One course. *Simpson*

199. The Changing South. (See Interdisciplinary Course 199.)

207. American Constitutional Interpretation. Development of the Constitution of the United States through Supreme Court decisions. Prerequisite: Political Science 127. One course. *Fish*

209. Problems in State Government and Politics. A study of the historical development of state governments, their present organization and subdivisions, and their relation to each other. Special attention is given to the position of the states in the federal union through the study of federal-state, interstate, and state-local relations. One course. *Leach*

230. American National Government. Formation and contemporary operation of the national political system; historical and behavioral approaches. One course.

241. Public Administrative Organization and Management. The American administrative process: theory and practice of administrative organization and management. One course. *Hall*

243. Administrative and Organizational Theory and Behavior. Behavioral analysis of public bureaucracies in the United States. One course.

244. Administrative Law and Process. The nature and law of the administrative process in the context of American government and politics, with special attention to the powers, procedures, and judicial control of administrative agencies. One course. *Hall*

246. Administration and Public Policy. The role of the administrative official as a policy-maker in modern American politics. One course.

275. The American Party System. An intensive examination of selected facets of American national political parties, such as relationships between presidential and congressional politics, the politics of national conventions, recent foreign policy and party alignments, and the controversy over party government. One course. *Kornberg*

279. The Legislative Process. An analysis of the structure and functions of Congress with emphasis on the behavior of legislators and resultant public policy. Some consideration will be given to American state and foreign legislatures. One course. *Paletz*

285. The Judicial Process. A study of judicial decision-making in the United States, with emphasis on the process of litigation, the recruitment of judges, the influences and limits on judicial decisions, and their impact within the political system. Prerequisites: Political Science 127 or 207 or their equivalents. One course. *Fish*

291. Problems of Urban Government. Analysis of problems in the structure and functions of urban governments in the United States. One course. *Leach*

293. Federalism. Theoretical and operational aspects of federalism, with emphasis on their application in the American governmental system. One course. *Leach*

INTERNATIONAL LAW AND RELATIONS

120. Conflict Resolution: Problems of War and Peace. The causes and preconditions of human conflict including such factors as deprivation, elite misconceptions, national myths, and civil strife. Consideration of restraints to violent conflict such as negotiation and bargaining. Relevant contemporary international issues such as Vietnam are studied within the context of current social science research. One course. *Eldridge*

121. Elements of International Relations. The nature of international politics; the analysis of national power; the instruments of foreign policy; and the controls of state behavior. One course. *Ball and Eldridge*

122. Modern International Politics. An examination of the major problems of postwar international politics with particular attention to the extension of Soviet power, the Western response to this challenge, and the revolutions in the Afro-Asian world. One course. *Eldridge*

157. U. S. Foreign Policy. Principles and problems; changing conceptions of diplomacy. One course.

158. Control of American Foreign Policy. A consideration of the forces which are responsible for the formulation of American foreign policy, and a study of the important factors which have influenced contemporary United States policy in the major areas of the world. The course includes an analysis of the respective roles of the President, Congress, Department of State, and the United Nations, as well as military and public opinion. One course. *Ball*

220. Problems in International Politics. Such topics as nuclear power, bipolarity and polycentrism, nationalism, national interests and ideology, the revolution of modernization, and regional integration. One course. *Kulski*

221. International Organization: The United Nations. Structure and functioning of the United Nations and of related specialized agencies. One course. *Ball*

226. Theories of International Relations. Interdependence of theory and research. One course. *Eldridge*

227. International Law. Elements of international law, particularly as interpreted and applied by the United States; rights and duties of states with respect to recognition, state territory and jurisdiction, nationality, diplomatic and consular relations, treaties, treatment of aliens, pacific settlement of disputes, international regulation of the use of force, and collective responsibility. One course. *Grzybowski*

237. Problems in American Foreign Policy. The decision-making process as applied to contemporary foreign policy issues. Prerequisite: Political Science 122 or the equivalent. One course. *Ball*

INDEPENDENT STUDY AND INTERNSHIPS

189, 190. Internship. Open to enrollment by students engaging in practical political or governmental work experience during the summer or a regular semester. To enroll a student must obtain the approval of the Director of Undergraduate Studies, arrange employment, and secure the agreement of a departmental faculty member to supervise a program of study related to the work experience. Two courses.

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by permission of the Director of Undergraduate Studies and of the individual instructor. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to seniors by permission of the Director of Undergraduates Studies and of the individual instructor. Two courses. *Staff*

UNDERGRADUATE SEMINARS

Introductory Seminar. (See 61S under Introductory Courses.)

Intermediate Seminar. Prerequisites: Political Science 61D or 61S and the consent of the instructor. Open to non-majors as well as to majors. One hundred-level courses designated in the class schedule with an *S* will be limited in enrollment

to a maximum of fifteen students and conducted as seminars. Different courses will be so designated in different years. Consult the official class schedule issued at the beginning of each semester for those currently being offered.

Senior Seminars in Political Science. Prerequisites: Political Science 61D or 61S and one 100- or 200-level course in the field represented by the seminar, and the consent of the instructor. Preference given to majors. Each seminar will not necessarily be offered every year. Consult the official class schedule.

200A. *Seminar in American Government and Politics.* One course. Staff

200B. *Seminar in Comparative Government and Politics.* One course.

Staff

200C. *Seminar in Political Theory.* One course. Staff

200D. *Seminar in International Relations.* One course. Staff

198. *Seniors Honors Seminars.* Open only to senior political science majors who are candidates for the degree with distinction. Preparation and writing of a research paper; group meetings to discuss common problems. Prerequisites: Political Science 197 and the consent of the instructor. One course.

Staff

DEPARTMENTAL MAJOR

Major Requirements. Political Science 61D or 61S. Seven courses in the department above 61D or 61S including two 200-level courses or 200-level seminars. Majors must take at least one course in each of three fields. Four related courses in departments approved by the political science adviser. Such courses are usually taken in the Departments of Economics, History, Philosophy, Psychology, and Sociology.

Honors. Any student who is qualified (see the section on Honors in this *Bulletin* for general requirements) may undertake work leading to a degree with distinction in political science by presenting himself to the Director of Undergraduate Studies as a candidate. In addition to meeting the normal requirements of a major in the department, the candidate for Graduation with Distinction must take Political Science 197 and 198. He must prepare a research paper on which he will be orally examined by a committee of three departmental faculty members.

Portuguese

For courses in Portuguese, see *Romance Languages*.

Psychology

Professor Jones, *Chairman*; Associate Professor Wing, *Director of Undergraduate Studies*; Professors Alexander, Borstelmann, Brehm, Carson, Diamond, Guttman, Lakin, Schiffman, and M. Wallach; Associate Professors C. Erickson, R. Erickson, Linder, Lockhead, and Staddon; Research Associate Professor Gaffron; Assistant Professors Aderman, Coie, Costanzo, Hall, Kalat, Kramer, Kremen, Robinson, and White; Lecturers Clifford, E. Crovitz, H. Crovitz, Davis, DeVoge, Eisdorfer, I. Gehman, Gentry, Kinsbourne, Krugman, Obrist, Peele, Shows, Somjen, Thompson, L. Wallach, and Wolbarsht; Adjunct Instructor Musia Lakin

70S, 71S. Freshman Seminars. Intensive experience through the study of one or two problems of special interest; does not fulfill departmental prerequisites. Prerequisite: departmental permission. Half-course or one course each. Staff

The following four first level courses are open to second semester freshmen, sophomores, juniors, and seniors without prerequisite. Some of these courses will have discussion sections or preceptorials, with the availability of these experiences to be specified prior to preregistration.

92. Sensation, Perception, and Learning. Sensation, including psychophysics and receptor processes. The concept of reflex, both physiological (Sherrington) and behavioral (Pavlov). Complex organization: learning, perception, and cognition. One course. *Guttman, Lockhead, Schiffman, and Staddon*

93. Biological Basis of Behavior. Behavior as a product of evolution and the role of behavior in species survival. Neural and endocrine factors in reproduction, hunger, thirst, emotion, and intelligence. Heredity-environment in the development of behavior. One course. *Diamond, C. Erickson, and Kalat*

94. Personality. Representative theories of personality, from Freud to the present, emphasizing problems of normal personality structure, dynamics, development, and assessment. Not open to students who have had Psychology 116. One course. *Alexander, Carson, and Kramer*

95. Developmental Psychology. Theory and research on growth and behavior from infancy to adolescence; special emphasis on personality and cognitive development. One course. *Coie and Costanzo*

Intermediate and Advanced Lecture Courses. Some of these offerings will include discussion sections or preceptorials, as specified prior to preregistration.

101. Social Psychology. Problems, concepts, and methods in the study of social interaction and interpersonal influence. Prerequisites: one course in psychology at the 90-level or permission of the instructor. One course. *Aderman, Jones, and Linder*

110. Applied Psychology. Applications of psychology to problems of personnel selection, industrial efficiency, advertising, and selling. Prerequisites: one course in psychology. One course. *Staff*

117. Statistical Methods in Psychology. Elementary statistical techniques and their application to the analysis and interpretation of psychological data. Theory of inference is stressed. Psychology majors only. One course. *Staff*

122. Laboratory in Observation of Children. Aspects of cognition, personality, social development, and child-adult relationships. Open only to junior and senior psychology majors with the permission of the instructor. One course. *Musia Lakin*

126. Adolescent Psychology. Mental, social, and emotional development of adolescence and youth. Prerequisite: Psychology 95 or the equivalent. One course. *Staff*

132. The Psychology of Individual Differences. Nature and causes of individual and group variations in intelligence, special abilities, social and emotional characteristics. Prerequisite: one course in psychology. One course. *Wing*

138. Abnormal Psychology. Disordered behavior and constructive personality change are viewed in interpersonal and social context for purposes of

understanding normal and abnormal personality development and functioning. Prerequisite: Psychology 94 or 95. One course. *Carson*

139. Motivation. Contemporary use of such concepts as instinct, drive, and expectancy in the explanation of behavior; the role of nervous mechanisms and hormones in the control of goal-directed behavior. Prerequisite: Psychology 92 or 93. One course. *C. Erickson and R. Erickson*

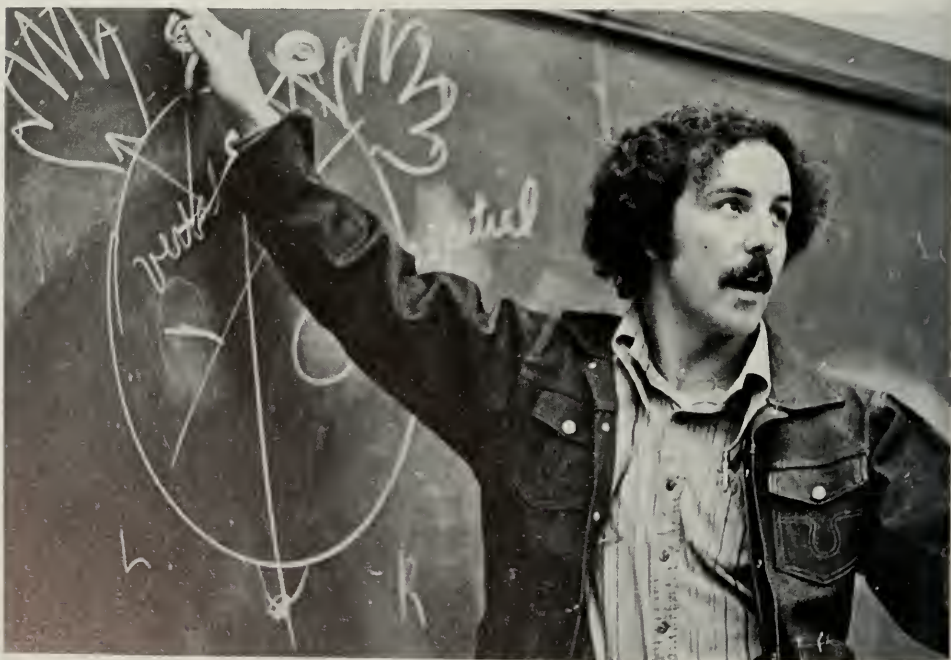
Laboratory Courses (140 through 149.) These courses are open chiefly to juniors and seniors. The subject matter varies, but these courses have in common a concern with the design and execution of psychological experiments. Students will find them helpful as a means of gaining experience before engaging in independent study. These courses fulfill the seminar learning experience requirement at the junior-senior level.

140. Research Methods in Child Development. Replication of existing research paradigms, critique of representative studies, and formulation of new approaches; emphasis on the preschool child. Prerequisite: Psychology 95. One course. *Borstelmann and Coie*

141. Tests and Measurements. Test methods used by psychologists to measure and evaluate mental processes. Prerequisite: Psychology 117 or the equivalent. One course. *Schiffman and Wing*

142. Instrumental Behavior. Laboratory course using animal subjects in operant-conditioning situations. Prerequisite: Psychology 92. One course. *Guttman and Staddon*

143. Experimental Methods in Cognitive Psychology. Human cognition; language, memory, problem-solving, and other higher mental processes. One course. *Staff*



144. Learning and Adaptive Behavior. Basic principles of adaptive behavior in animals, with special emphasis on the effects of reinforcement. Participation in experiments with animals. Prerequisite: Psychology 92 or 93, or permission of instructor. One course. *Staddon*

145. Experimental Approaches to Personality. Methods applied to personality research. Prerequisite: Psychology 94. One course. *Costanzo, Schiffman, and Wallach*

146. Experimental Comparative Psychology. The bearing upon general psychological theory of experimental investigations of animal behavior in the fields of motivation and learning. Prerequisite: Psychology 92 or 93. One course. *C. Erickson and Kalat*

147. Experimental Social Psychology. Group dynamics, attitude change, and interpersonal perception. Prerequisite: Psychology 101. One course. *Aderman, Brehm, Jones, and Linder*

148. Psychology of Perception and Thinking. Basic phenomena of perception and thinking as determined by conditions in the external situation and in the person—biological and psychological. Prerequisite: Psychology 92. One course. *H. Crovitz and Lockhead*

149. Physiological Psychology Laboratory. Neural bases of behavior, sensory and motor functions of the nervous system, and problems of emotion, motivation, and consciousness. Laboratory in psychophysics and the electrical activity of the nervous system. Prerequisites: Psychology 93, Physics 1-2, or Chemistry 1-2 or permission of the instructor. One course. *R. Erickson*

Courses numbered 150-170 fulfill the seminar learning experience requirement at the junior-senior level.

151. Psychology and International Relations. Application of psychological theories to problems of international relations. Prerequisites: two courses in psychology and permission of instructor. One course. *Martin Lakin*

152. Psychological Approaches to Contemporary Problems. Relevance of various psychological theories and findings to selected contemporary issues. Prerequisite: permission of the instructor. One course. *Staff*

165. Personality Theory. Theories of personality from larger metatheoretical perspectives. Open to junior and senior majors in psychology, or by permission of the instructor. Prerequisite: Psychology 94. One course. *Alexander or Kremen*

170. A-D. Seminar in Selected Problems. One course each. *Staff*

Tutorial Study. For juniors and seniors. Small group discussions of influential books and articles in psychology. The availability of tutorials, their content, and their instructors will be announced before preregistration.

171, 172. Junior Tutorial. Prerequisites: Psychology 92 or 93, Psychology 94 or 95 and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*

173, 174. Senior Tutorial. Prerequisites: Psychology 92 or 93, Psychology

94 or 95, Mathematics 32, 51, 133, 135, 136 or Psychology 117 or the equivalent, and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*

177, 178. Independent Research. Admission to the course requires formulation of a study plan with a faculty supervisor and approval of the Director of Undergraduate Studies. Prerequisites: Psychology 92 or 93, Psychology 94 or 95, and one psychology course numbered 140 through 149; Mathematics 133 or Psychology 117 will be helpful. One or two courses. *Staff*

191, 192. Junior Independent Study and Research. Directed reading and research. Open only to highly qualified juniors who expect to graduate with distinction in psychology. Prerequisite: permission of the department. One or two courses. *Staff*

193, 194. Senior Independent Study and Research. Directed reading and research for seniors planning to graduate with distinction in psychology. Prerequisite: permission of the department. One or two courses. *Staff*

Courses at the 200-level are open to selected undergraduates with written permission of the instructor.

203. Sensation and Perception. Classical concepts in sensation and perception and the resulting psychophysical data for each of the major senses, with emphasis on vision and audition. One course. *Lockhead*

204. Comparative Psychology. Ontogeny, evolution, adaptive significance, and physiology of animal behavior. One course. *C. Erickson*

210. Cognition and Higher Mental Processes. An intensive analysis of the literature on thinking, problem-solving, creativity, language, and related topics. Emphasis is upon the functional significance of these aspects of intellectual activity and upon the experimental methodology involved in their study. One course.

215. Developmental Psychology. Child behavior and development, including personality, cognition, perception, and learning. One course. *Staff*

216. Biological Psychology. The methods of biology (as applied to psychology), especially in neurophysiology, neuroanatomy, and genetics. Topics covered include: (a) the genetics of behavior (b) the organization of the dorsal thalamus and neocortex, and (c) the limbic system and hypothalamus. Methods covered include: (a) ablation method, (b) method of evoked potential, (c) electrical stimulation of the brain, and (d) classical and physiological genetics. One course. *Diamond*

217. Social Psychology. Social factors in cognition, models of social interaction, conformity and social influence, and attitude development and change. One course. *Jones*

218. Research Methods in Social Psychology. Emphasis on the interplay between experimental design and technique. One course. *Linder*

219. Physiological Psychology I. The structure and function of the nervous system as related to problems of sensory-motor processes and learning. One course. *R. Erickson*

220. Physiological Bases of Behavior. Emphasis on the neural, hormonal, and developmental bases of motivational behavior. One course. *C. Erickson*

234. Seminar in Personality. Selected research topics of current interest in experimental study of personality, including risk-taking, creativity, and cognitive styles. One course. *Wallach*

236. Theoretical Psychology. Representative systematic formulations and schools in historical sequence. One course. *Guttman*

238. The Electroencephalogram and Psychological Function. A survey of experimental and clinical literature on brain wave correlates of intelligence, personality, behavior disorders, epilepsy, sleep, sensory stimulation, reaction time, and attention. Special emphasis is placed on the electrophysiology of conditioning and learning. Lectures, laboratory demonstrations, and clinical case presentations. One course. *Obrist*

239. Behavioral Correlates of Brain Damage in Man. Effects of brain damage on psychological functioning. Known brain-behavior relationships and problems encountered in the study of brain function. Laboratory demonstrations for assessment of cerebral dysfunction through the use of standard psychological tests. One course. *Thompson*

245. Personality Theory I. Representative theories of human functioning, from Freud to neoanalytic approaches. One course. *Alexander and Kremen*

246. Personality Theory II. Representative models of human functioning, as field theory, behavior theory, type or trait theory, and ego psychology. One course. *Alexander or Kremen*

271. A-D. Seminar in Selected Problems. One course each. *Staff*

282. Introduction to Methods in Psychotherapy. Current trends in psychotherapeutic practice and research are discussed, as a means of introducing the student to the field. Emphasis is upon the application of principles drawn from theories of personality to individual and group psychotherapy. Discussions of selected readings and some field experience in therapy are included. One course. *Lakin and Carson*

291. Seminar in Community Mental Health. Psychological epidemiology and ecology; primary, secondary, and tertiary prevention; the public health approach to problems of psychological disorders and psychological well-being. One course. *Altrocchi*

292. The History of Psychology. One course. *Guttman*

293. Methods in Developmental Psychology. Methodological and epistemological issues in research in development. Individual and group research projects are an integral part of the course. One course. *Staff*

DEPARTMENTAL MAJOR

Major Requirements. Psychology 92 or 93 and 94 or 95. At least one of the following courses: Mathematics 32, 51, 133, 135, 136, Psychology 117 or the equivalent. One laboratory course in the 140-149 series. Four additional psychology courses of student's selection.

Students seeking a B.S. degree must complete, in addition to the above requirements, a minimum of four laboratory courses in the sciences and Mathematics 31 and 32, or their equivalent.

Interdisciplinary Programs. Psychology touches upon and merges with many related fields of study. The department encourages its students to consider interdisciplinary majors. Some examples of possible programs are biological psychology, mathematical psychology, and philosophy and psychology. Students who contemplate an interdisciplinary program should make appropriate plans as early as possible in their undergraduate careers.

Religion

Associate Professor Partin, *Acting Chairman*; Associate Professor Wintermute, *Director of Undergraduate Studies*; Professors Bradley, Osborn, Phillips, Poteat, and Price; Associate Professors Clark, Jones, Kort, McCollough, and Meyers; Assistant Professors Burford, Charlesworth, Jenks and Lawrence; Instructor Corless; Lecturers Little and Shows

The academic study of religion is integral to a liberal education. The curriculum is determined by the subject around which the department is formed, by the various areas and methods for the study of religion, and by the department's desire to increase and discipline the students' understanding of and appreciation for those religious phenomena and problems brought into focus by each area and method.

In addition to Biblical studies and studies in Christian history, ethics, and theology, the department offers courses in Judaic and non-Western religious studies as well as courses of a substantially interdisciplinary character (religion and the social sciences and religion and the humanities).

Courses numbered below 100, with the exception of Religion 70S and Religion 71S, are open to all students. Religion 70S and 71S are freshman-sophomore seminars. (The specific topics for these seminars and the names of instructors will be announced prior to preregistration.) One-hundred-level courses are open to juniors and seniors without prerequisite except in the cases in which the requirement of permission of the instructor is stated at the end of the course description. Freshmen and sophomores who have completed one course below 100 may be admitted to 100-level courses with the exception of junior-senior seminars. (The topics for these seminars and the names of the instructors will also be announced prior to preregistration.)

50. The Old Testament. Historical, literary, and theological investigations. One course. *Staff*

52. The New Testament. Origins, development, and content of thought. One course. *Staff*

55. The Religion of the Bible. An historical, cultural, and theological study of the Old and New Testaments. One course. *Staff*

50D, 52D, 55D. Same as 50, 52, 55 with discussion section included. One course. *Staff*

57. Introduction to the History of Religions. Historico-religious study of primitive religions, Hinduism, Buddhism, Islam, and other religions. One course. *Staff*

59. Problems in Theology and Ethics. Philosophical, theological, and cultural problems, such as the existence of God, ethical theory, religious language, and the relation of religion to culture. One course. *Staff*

70S, 71S. Freshman-Sophomore Seminars: Religious Studies. Topics and instructors to be announced. One course.

BIBLICAL STUDIES

101. Principles of Archaeological Investigation. Supervised field work, visits to other excavations, introduction to ceramic chronology, numismatics, and other related disciplines. Excavation of the late Roman village of Khirbet Shema, Galilee. Offered in Israel, only in the summer. One course. *Meyers*

102. Palestine in Late Antiquity. The history, literature, and archaeology of Roman Palestine with particular emphasis on Galilee in rabbinic and early Christian times. One course. *Meyers*

104. The Prophets of the Old Testament. Their historical setting and message. One course. *Wintermute*

105. Theology of the Old Testament. Emphasis upon history and eschatology, covenant, messianism, and wisdom; evaluation of Eichrodt, Jacob, and von Rad. One course. *Jenks*

106. The Mission and Message of Jesus. An analysis and interpretation of the Gospels. One course. *Charlesworth and Price*

107. Theology of the New Testament. A systematic analysis of the theologies of the New Testament writers and an attempt to synthesize the basic and shared themes. One course. *Charlesworth*

108. The Life and Letters of Paul. Paul's role in the expansion of the Christian movement, the most important aspects of his thought, and his continuing influence. One course. *Charlesworth and Price*

109S, 110S. Junior-Senior Seminars: Biblical Studies. Topics and instructors to be announced. One course.

113. African Philosophy. (Also listed as Black Studies 113.) One course. *Olela*

STUDIES IN CHRISTIAN LIFE AND THOUGHT

120. History of the Christian Church. Crucial events, issues, forms, and writings that have shaped the Christian community and influenced Western civilization from the time of the early church. One course. *Jones*

124. Christianity in America. Representative men, movements, and thought in American Christianity. One course. *Jones*

125. Religion and Theology of Black America. Black religion in its historical and social context, with critical appraisal of major works. One course. *Burford*

126. Themes in Christian Theology. Study of Christian teachings concerning God, Jesus Christ, sin, and salvation, intended to serve as a basis for the student's evaluation of his own religious concepts. One course. *Osborn*

128. The Background of Contemporary Christian Thought: 1918-1950. Theology of Karl Barth, Rudolf Bultmann, Paul Tillich, Karl Rahner, Reinhold Niebuhr, and others. One course. *Osborn*

129. The Frontiers of Contemporary Christian Thought. Radical and prophetic movements as represented by Dietrich Bonhoeffer, Harvey Cox, Leslie Dewart, Jurgen Moltmann, and others. One course. *Osborn*

130. Christian Ethics. Ethical implications of Biblical religion, the historical development of the Christian ethics, and the ethical dimensions of contemporary social life. One course. *Clark and McCollough*

138S, 139S. Junior-Senior Seminars: Studies in Christian Life and Thought. Topics and instructors to be announced. One course.

HISTORY OF RELIGIONS

140. Religions of South Asia. Religious traditions of South Asia, with emphasis on Hinduism. One course. *Bradley and Lawrence*

141. Religions of China and Japan. Confucianism, Taoism, Buddhism, Shinto, and other religious traditions of China and Japan. One course. *Corless*

142. Myth and Symbol. Historical and phenomenological study of religious myths and symbols, Christian and non-Christian. One course. *Partin*

143. Mysticism. The mystical element in religion: Hinduism, Buddhism, Christianity, and Islam. One course. *Bradley*

144. The Foundations of Post-biblical Judaism. History, religion, and literature of Pharisaic and sectarian Judaism from the time of Ezra to Rabbi Judah. One course. *Meyers*

145. Religious Quests of the Greco-Roman World. Sectarian Judaism, the Mystery Cults, and Gnosticism. One course. *Wintermute*

146. Contemporary Jewish Thought. Modern Jewish thought from Mendelsohn to the present, with particular reference to American thinkers. One course. *Meyers*

147S, 148S. Junior-Senior Seminars: Judaic Studies. Topics and instructors to be announced. One course.

149S, 150S. Junior-Senior Seminars: History of Religions. Topics and instructors to be announced. One course.

RELIGION AND THE SOCIAL SCIENCES

151. Ethical Issues in Social Change and Public Policy in America. An examination, based on work in Christian ethics and current sociological theory. One course. *McCollough*

154. Ethics and Modern Technology. Emerging ethical issues created by the impact of technology on the psychological, social, political, and economic life of modern man. One course. *Clark*

155. Ethical Issues in the Life Cycle. Human development viewed in religious, ethical, and psychological perspectives. One course. *McCollough*

156. Christian Marriage and the Family. Marriage and the family in American society studied from the Christian perspective. Attention will be given to the teachings of the churches and of psychologists and sociologists concerning courtship and marriage, sex, parent-child relationships, mixed marriages, and divorce. One course. *Phillips*

158. Psychology and Religion. Contributions of major psychological theories to an understanding of religion, especially Christianity. One course. *Shows*

159S, 160S. Junior-Senior Seminars: Religion and the Social Sciences. Topics and instructors to be announced. One course.

170. Problems of Religious Thought. Analysis of credentials for belief in God. One course. *Poteat*

174. Religion and the Poetics of Vision. The liturgical shaping of life as embodied in selected works of painting and sculpture. One course. *Poteat*

187. Religious Values in Classical and European Literature. A consideration of the religious insights, explicit and implied, in representative writings. One course. *Kort*

188. Recent Literature and its Religious Implications. Religious elements in recent literature. One course. *Kort*

189S, 190S. Junior-Senior Seminars: Religion and the Humanities. Topics and instructors to be announced. One course.

INDEPENDENT STUDY

191, 192. Independent Study. With departmental approval. One course. *Staff*

193, 194. Independent Study. With departmental approval. One course. *Staff*

FOR SENIORS AND GRADUATES

210. Contemporary British Theology. Selected problems in representative British theological writings after 1900. One course. *Langford*

211. Authority in Theology. One course. *Langford*

228. Theology of the Gospel and Epistles of John. A study of the origin of these writings, the provenance of their thought forms and symbolism, their influence on the early church, and their contemporary significance. One course. *Price*

231. Religion and Contemporary Thought. Polanyi, Arendt, Trilling, and others, with appraisal of their relevance to theological inquiry. One course. *Poteat*

232. Religion and Literature: Perspectives and Methods. Selected literary works as interpreted by myth or archetype critics and by theological critics. One course. *Kort*

233. Modern Narrative and Religious Language. Fiction of selected American, British, and continental writers of the first half of the twentieth century,

with special attention to the role of religious language in their work. One course.
Kort

248. Theology of Karl Barth. An historical and critical study of Barth's theology. One course. *Osborn*

249. Doctrine of The Church in Contemporary Theology. One course.
Osborn

280. The History of Religions. A study of the methodology of the history of religions, the nature of religious experience, and specific categories of religious phenomena. One course. *Partin*

281. Phenomenology and Religion. Scheler, E. Straus, Merleau-Ponty, Ricoeur, Binswanger, or others; their bearing upon religious knowledge and practice. One course. *Poteat*

283. Religions of East Asia. Major traditions of China and Japan; emphasis on Buddhism. One course.

284. The Religion and History of Islam. Origins and development of the Islamic community and tradition, with particular attention to the religious element. One course. *Partin*

285. Religions of India. With particular attention to Hinduism. One course.

289. World Religions and Social Change. The contemporary role of Buddhism, Christianity, and Islam in Asia and Africa. One course. *Bradley*

293. Sociological Analysis of Religion. Components of a religion (belief-systems, liturgical practices, ethical teachings, institutional structure, and modes of operation) as they function in relation to social cohesion, social conflict, and social reform. One course. *Clark*

294. Institutional Analysis of Religious Bodies. Internal structure and dynamics of religious groups. One course. *Clark*

295. Ethics and Economic Life. Historical teachings of the Christian churches in the area of economic life, contemporary norms of economic justice, and current public and private economic policies and policy-making processes. One course. *Clark*

DEPARTMENTAL MAJOR

Major Requirements. Seven courses, which must include one course in each of at least three of the five areas of the curriculum (it is recommended that biblical studies and history of religions be two of these three areas). The seven courses must include two courses at the introductory level (50, 52, and 55 in the area of biblical studies; 57 in history of religions; 59 may count in any of the three remaining areas) and a Junior-Senior Seminar or a 200-level course.

Reserve Officers Training Program

AIR FORCE AEROSPACE STUDIES

Professor Knops, Lt. Colonel, USAF, *Chairman*; Associate Professor Scott, Major, USAF, *Director of Undergraduate Studies*; Assistant Professor Lohner, Major, USAF, *Supervisor of Freshman Instruction*

Eligibility Requirements. All freshmen, male or female, are eligible to enroll in the General Military Course in the Air Force ROTC. For enrollment in the Professional Officer Course, the student must have completed successfully either the General Military Course or the six weeks Field Training Course; must execute a written agreement with the government to complete the Professional Officer Course; must be sworn into the Enlisted Reserve; and he must agree to accept a commission in the United States Air Force Reserve upon graduation.

Deposit. Each student must make a deposit of twenty dollars with the Bursar's Office to ensure the return of all government property.

General Military Courses

First Year

1. Defense of the United States. A study of the causes of world conflict, the problem of United States security, and the role of the armed forces as instruments of national policy. (May not be counted to satisfy graduation requirements.) Half-course. *Lohner*

4. Corps Training. No course credit. *Staff*

Second Year

51. World Military Systems. A comparative study of free world military forces, Communist military systems, and trends in the development and employment of military powers. (May not be counted to satisfy graduation requirements.) Half-course. *Lohner*

54. Corps Training. No course credit. *Staff*

Professional Officer Courses

All students selected to continue aerospace studies pursue the following courses:

First Year

101, 102. Growth and Development of Aerospace Power. A study of development of aerospace power in the United States; mission and organization of the Defense Department; Air Force concepts, doctrine, and employment; astronautics and space operations; future development of aerospace power. Two courses. *Scott*

104. Corps Training. No course credit. *Staff*

Second Year

201, 202. The Professional Officer. Studies in the principles of leadership and management and their professional application. Final portion of the first semester is devoted to the Military Justice System. Two courses. *Knops*

203. The Problems of Flight and the Aerospace Sciences of Weather and Navigation. Mandatory for pilot and navigator cadets, approval of instructor for all others. Half-course. *Lohner*

204. Corps Training. No course credit. *Staff*

NAVAL SCIENCE

Professor Cocowitch, Captain, U. S. Navy, *Chairman*; Visiting Associate Professor Banks, Commander, U. S. Navy, *Director of Undergraduate Studies*; Visiting Assistant Professors Hagan, Lieutenant Colonel, U. S. Marine Corps, Eisenhardt, Lieutenant, U. S. Navy, Rivers, Lieutenant, U. S. Navy, McDonnell, Lieutenant, U. S. Navy, and Mann, Lieutenant, U. S. Navy

Completion of all naval science courses listed is required for a commission. A maximum of four naval science courses may be offered as electives in satisfying degree requirements in Trinity College; only two naval science courses (junior or senior level) can be so offered in the School of Engineering. Fifteen hours of drill are required each semester.

11. Naval Orientation. Military formations, movements, commands, courtesies, and honors; and elements of unit leadership. *Mann*

12. Naval Ships Systems. Structure, elements of design, stability, control compartmentation, communications, and propulsion systems as they bear on safe operation and combat or service effectiveness. *Mann*

51. Seapower and Maritime Affairs Seminar. Strategic, tactical, and diplomatic aspects of seapower. *Rivers*

52. Seapower and Maritime Affairs Seminar. Strategic, tactical, and diplomatic aspects of seapower. *Rivers*

125P. Naval Organization and Management. Naval lines of command and control; organization for logistics, service, and support; research on and practical application of fundamental management principles at lower echelons of Navy management structure. (Required preceptorial for NROTC students taking Management Sciences 125.) No course credit. *McDonnell*

126. Naval Personnel Administration. A study of the principles and problems of effective leadership and administration, with emphasis on the role of the military leader. Leadership precepts of personal example, sound management practice, and moral responsibility; human relations; discipline and administration of military justice are included. *McDonnell*

131. Navigation. Theory, principles, and procedures of ship navigation, movements, and employment. Dead reckoning, piloting, and electronic and celestial navigation. *Eisenhardt*

131L. Navigation Laboratory. Practical application of the theories and principles of navigation as presented in the lecture series. *Eisenhardt*

132. Naval Operations. Components of general naval operations, including concepts and application of tactical formations and dispositions, relative motion, maneuvering board and tactical plots, rules of the road, and naval communications. *Eisenhardt*

141. Evolution of Warfare. A survey of the development of weaponry, tactics, and strategy affiliated with warfare, as exemplified by confrontations selected for detailed study through World War II. *Hagan*

151. Amphibious Operations. An examination of the development of U. S. amphibious doctrine, with emphasis on current applicability of that doctrine. *Hagan*

Romance Languages

Professor Fein, *Chairman*; Associate Professor Ripley, *Director of Undergraduate Studies in French*; Professor Davis, *Director of Undergraduate Studies in Spanish*; Associate Professor Hull, *Supervisor of Language Instruction*; Professors Cordle, Fowlie, Predmore, Tetel, and Wardropper; Visiting Professor Niess; Associate Professor Vincent; Assistant Professors Alstad, Auld, Barlow, Bryan, Caserta, Cox, Landeira, Miller, and Murray; Instructor Steegar; Part-time Instructors de la Queriére, Grant, and O'Neill

French 63-64 and Spanish 63-64 or equivalent are the prerequisites for all elective courses. Students who, by reason of foreign residence, have had special opportunities in French or Spanish must be classified by the appropriate director of undergraduate studies.

In addition, students who elect French 91, 92, 93S, 94S, or Spanish 91, 92, 93S, or 94S may use any of these courses to fulfill the divisional requirement in humanities.

FRENCH

1-2. Elementary French. Introduction to understanding, speaking, reading, and writing French. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. (Special sections designated with an *X* are for those students with one or two years of secondary school French who do not qualify for French 63 or 64). Two courses. *Hull and Staff*

63. Intermediate French. Intensive grammar review and training in reading; laboratory practice. One course. *Auld and Staff*

64. Intermediate French. Open to students who have passed French 63 or by special placement. Readings in contemporary literature; practice in composition. One course. *Auld and Staff*

91, 92. Introduction to French Literature. An introduction to the major writers of the French literary tradition. Selections and complete works of poetry, fiction, theater, and essay. In the first semester: Middle Ages through the eighteenth century. In the second semester: nineteenth and twentieth centuries. Lectures and discussions; short essays and tests. Conducted in French. Two courses. *Fowlie and Staff*

91D, 92D. The same courses as French 91, 92 except taught as lectures with small group discussion sections. Two courses.

91P, 92P. Preceptorial. Elective preceptorials for students enrolled in French 91, 92.

93S. French Literature. Topics to be announced. Fall semester. Open to freshmen and sophomores. One course. *Staff*

94S. French Literature. Topics to be announced. Spring semester. Open to freshmen and sophomores. One course. *Staff*

97. Conversational French. Intensive instruction in oral and written expression. Contemporary French prose provides the basis for vocabulary building and for practice in structural patterns. Limited to 15 students. Does not satisfy the

minimum uniform requirement. Prerequisite: French 64 or proficiency. One course. *Bryan and Staff*

98. French Phonetics. Sounds, rhythm, intonation. Individual practice in language laboratory. Readings in phonetic theory. One course. *Hull and Steegar*

100. Masterworks of French Literature. An intensive study of selected works of French literature with special emphasis on developing critical techniques. Open only to freshmen, through the Advanced Placement Program or by invitation of the department. One course. *Staff*

104S. The Sixteenth Century. An introduction to the spirit of the French Renaissance as reflected in the literature of the age of Rabelais and Montaigne, Ronsard, and Du Bellay. One course. *Vincent and Tetel*

105. Explication de Textes. A study of the French method of textual analysis, with selections primarily from the nineteenth and twentieth century authors. For students who have taken 91 and 92. One course. *Fowlie*

106S. Montaigne. A close reading of selected *Essais* aiming to integrate themes, structure, and style; frequent comparative allusions will be made to Proust, Pirandello, Malraux, and Sartre. One course. *Tetel*

108. French Romanticism. The beginnings of the modern era, in its quest for new values and a new expression, as studied through the great lyric poets and prosodists of the first half of the nineteenth century. Readings from Chateaubriand, Lamartine, Musset, Hugo, Vigny, and others. One course. *Staff*

109. Toward Modernism in French Poetry. An introduction to modern trends in the nineteenth century; emergence from traditional Romanticism; Art for Art's Sake and the Parnassians (Gautier, Leconte de Lisle); the transition from Decadence to Symbolism (Baudelaire, Verlaine, Rimbaud, and Mallarme). One course. *Barlow*

111. French Drama of the Nineteenth Century. A survey of the French theatre from the Romantic period to the *Theatre libre*. One course. *Staff*

112. French Drama of the Twentieth Century. Reading of representative plays selected from the works of Bernstein, Maeterlinck, Rostand, Sarment, Vildrac, J. J. Bernard, Claudel, Lenormand, Pagnol, Giraudoux, Anouilh, and others. One course. *Staff*

115. The Nineteenth-Century Novel. Intensive study of selected novels from the works of Stendhal, Balzac, Flaubert, and Zola. Not open to students taking French 221 or 222. One course. *Staff*

117S. Masterpieces of French Medieval Literature. Lyric poetry, epic, romance, and theater from beginning to the middle French period. One course. *Ripley*

119. French Drama of the Seventeenth Century. The plays of Corneille, Racine, and Moliere are used to explore tragedy and comedy. One course. *Auld*

120. Seventeenth-Century Poetry, Novel, and Rhetoric. Analysis of form and thought in selected works of La Fontaine, Mme. de La Fayette, Pascal, La Rochefoucauld, and La Bruyere. One course. *Auld*

- 121. The French Enlightenment.** Religion, politics, and philosophic and literary ideas of eighteenth century France. Montesquieu, Voltaire, Rousseau, and others. One course. *Staff*
- 122. The Novel in the Eighteenth Century.** Theory and practice of prose fiction as seen in selected works of Marivaux, Prevost, Diderot, Rousseau, and Laclos. One course. *Alstad*
- 127. Advanced Composition and Conversation.** A systematic review of grammar; frequent oral and written reports. Attention to the problems of pronunciation and diction. Prerequisite: French 97 or consent of the instructor. One course. *Bryan*
- 129. French Civilization.** Contemporary France as seen through its history, institutions, customs, and arts. Readings and discussion in French. One course. *Auld*
- 132. French Poetry of the Twentieth Century.** The symbolist heritage and surrealism. One course. *Barlow*
- 133, 134. Contemporary French Life and Thought.** Major writers of the twentieth century and their historical and cultural circumstances. First semester: Claudel, Gide, Valery, Proust, Apollinaire, Mauriac, Romain, Cocteau. Second semester: Giono, Breton, Aragon, Malraux, Sartre, Beckett, Camus, Robbe-Grillet. Two courses. *Cordle*
- 150T. Tutorial in Composition.** Half-course. *Hull and Staff*
- 181-182. French.** An intensive introduction to the language and literature. Open only to students who have achieved proficiency in another language. Two courses. *Ripley*
- 191, 192. Independent Study.** Directed reading and research. Open only to highly qualified juniors by permission of the department. Two courses.
- 193, 194. Independent Study.** Directed reading and research. Open only to highly qualified seniors by permission of the department. Two courses.
- 209. Advanced Composition and Syntax.** Comparative English-French stylistics. Practice in controlled and free writing. One course. *Hull*
- 210. The Structure of French.** Modern French phonology, morphology, and syntax. Readings in current linguistic theory. One course. *Hull*
- 213. French Literature of the Seventeenth Century.** Its initial phase. Readings in the major literary works to the middle of the century. One course. *Auld*
- 214. French Literature of the Seventeenth Century.** Its "classical" phase. Readings in the major literary works from the middle to the end of the century. One course. *Auld*
- 217. Mallarmé and Rimbaud.** The symbolism and the formal elements of Mallarmé's poetry. The poetic theory and the psychic elements in Rimbaud's poetry. One course. *Fowlie*
- 219. Old French Literature.** An introduction to the reading of medieval French literary texts. One course. *Vincent*

221. The Nineteenth-Century French Novel. The initial phase. The Romantic hero in conflict with society, with special emphasis on the works of Stendhal and Balzac. One course. *Staff*

222. The Nineteenth-Century French Novel. A continuation of French 221. The decline of the individual hero. Flaubert and Zola will receive intensive study. One course. *Staff*

223. French Literary Criticism. A history of critical theory in France and a study of the major critics from the Renaissance to today. One course. *Fowlie*

224. History of the French Language. The evolution of French from Latin to its present form; integral developments and external influences. One course. *Hull*

225, 226. From Renaissance to Baroque in French Literature of the Sixteenth Century. First semester: literary prose. Readings from Jean Lemaire de Belges, Marguerite de Navarre, Rabelais, Montaigne, and others. Second semester: poetry and theater. Readings from Marot, Sceve, Labe, Saint Gelais, the Pleiade, d'Aubigne, Sponde, Du Bartas, Garnier, and others. Two courses. *Tetel*

228. French Poetry of the Twentieth Century. In the wake of symbolism: Valery and Claudel; poetry as ritual: Peguy; Apollinaire and surrealist poetry; the contemporary movement: Michaux, Char, Saint-John Perse. One course. *Fowlie*

233. Contemporary French Theatre. A study of dramatic theory; the art of the leading directors; and the major texts of Claudel, Giraudoux, Anouilh, Sartre, Beckett, Ionesco, and Genet. One course. *Fowlie*

234. Proust. A study of *A la recherche du temps perdu*. The thematic structure and the aesthetics of the work. This course is designed for graduates, but may be taken by qualified seniors and by a limited number of juniors with the permission of the instructor. One course. *Fowlie*

236. Baudelaire. A study of the poetry and criticism of Baudelaire as contributing to the origins of modern art and literature. One course. *Fowlie*

241, 242. French Literature and Thought in the Age of Enlightenment. First semester: the new philosophy and its propagation. Second semester: the crisis in literary aesthetics. Two courses. *Staff*

245. French Literature of the Twentieth Century: to 1935. Emphasis on Gide, Mauriac, and Malraux. One course. *Cordle*

246. French Literature of the Twentieth Century: after 1935. Emphasis on Sartre, Camus, and the *nouveau roman*. One course. *Cordle*

ITALIAN

1-2. Elementary Italian. Introduction to understanding, speaking, reading, and writing. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. Two courses. *Alstad and Staff*

63. Intermediate Italian. Intensive grammar review and training in reading; laboratory practice. One course. *Caserta and Staff*

64. Intermediate Italian. Open to students who have passed Italian 63 or by special placement. Readings in contemporary literature; practice in composition. One course. *Caserta and Staff*

101, 102. Masterworks of Italian Literature in English Translation. First semester: from the origins to the Baroque. Second semester: Ottocento and Novecento. Two courses. *Caserta*

129. Modern Italy. Political, social, economic, and cultural problems in Italian history from 1861 to the present day. One course. *Caserta*

181-182. Italian. Intensive introduction to the language. Modern readings. Completion of the second year of another foreign language will normally be required as a prerequisite. Two courses. *Tetel and Caserta*

183, 184. Readings in Italian Literature. Historical and critical analysis. First semester: Dante, Petrarch, Boccaccio, Machiavelli, Ariosto, and Tasso. Second semester: Foscolo, Manzoni, Leopardi, Verga, and important contemporary novelists. Conducted in Italian. Two courses. *Caserta*

191, 192. Independent Study. Directed reading and research for juniors. Two courses. *Staff*

193, 194. Independent Study. Directed reading and research for seniors. Two courses. *Staff*

283. Italian Novel of the Novecento. Representative novelists from Svevo to the most recent writers. One course. *Caserta*

284. Dante. *La Vita Nuova* and a close reading of the *Inferno*. The course will be conducted in English. Reading in Italian or English. One course. *Fowlie*

288. The Renaissance. Petrarch, Boccaccio, and Ariosto. One course. *Tetel*

PORTUGUESE

181-182. Portuguese. Intensive introduction to the language. Modern readings. Completion of the second year of another foreign language will normally be required as a prerequisite. Two courses. *Miller*

183. Readings in Modern Brazilian Literature. Prerequisite: Portuguese 181-182 or permission of the instructor. One course. *Miller*

184. Literature of the Explorations: Asia, Africa, Latin America. Prerequisite: Portuguese 181-182 or permission of the instructor. One course. *Miller*

185, 186. Conversation. Intensive practice in spoken Brazilian Portuguese. Prerequisite: Portuguese 181, 182 or permission of the instructor. Half-course. *Miller*

SPANISH

1-2. Elementary Spanish. Introduction to understanding, speaking, reading, and writing Spanish. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. (Special sections, designated with an X, are for students with one or two years of secondary school Spanish who do not qualify for Spanish 63 or 64). Two courses. *Miller and Staff*

63. Intermediate Spanish. Intensive grammar review and training in reading, laboratory practice. One course. *Landeira and Staff*

64. Intermediate Spanish. Open to students who have passed Spanish 63 or by special placement. Readings in contemporary literature; practice in composition. One course. *Landeira and Staff*

64P. Preceptorial. Elective preceptorial for students enrolled in Spanish 64.

91, 92. Introduction to Spanish Literature. An introduction to the major writers of the Spanish literary tradition. Selections and complete works of poetry, fiction, theater, and essay. First semester: Middle Ages through the eighteenth century. Second semester: nineteenth and twentieth centuries. Conducted in Spanish. Prerequisite: Spanish 63-64 or equivalent. Two courses. *Staff*

91P, 92P. Preceptorial. An elective preceptorial for students enrolled in Spanish 91, 92. *Staff*

93S. Spanish Literature. Topics to be announced. Fall semester. Open to freshmen and sophomores. One course. *Staff*

94S. Spanish Literature. Topics to be announced. Spring semester. Open to freshmen and sophomores. One course. *Staff*

97. Spoken Spanish. Intensive instruction in the spoken language: contemporary Spanish prose provides the basis for vocabulary building, and for practice in structural patterns. Limited to fifteen students. Prerequisite: Spanish 64 or equivalent. One course. *Staff*

117S. Masterpieces of Spanish Medieval Literature. Selected works of the Medieval period. One course. *Murray*

150T. Tutorial in Composition and Syntax. Half-course. *Staff*

155. Spanish American Short Fiction. Novelettes and short stories of the twentieth century. One course. *Fein*

156. The Spanish American Novel. Masterworks of the nineteenth and twentieth centuries. One course. *Fein*

161. Spanish Literature of the Renaissance and the Baroque. A study of selected works of the sixteenth and seventeenth centuries with attention to their reflection of social, religious, and political ideas. One course. *Miller and Cox*

162. Spanish Romanticism. A study of the romantic spirit in modern Spanish literature. One course. *Staff*

163. The Generation of 1898. Special emphasis on the novel and essay. The precursors: "Clarín" and Galdós; Unamuno, Baroja, "Azorín," Valle-Inclán; influence on the next generations; Pérez de Ayala and Ortega y Gasset. One course. *Predmore and Landeira*

164. Topics of Spanish Civilization. A humanistic study of Spain as a nation through its history, culture, people, and institutions. One course. *Landeira*

165S. Analysis of Great Spanish Authors. A close textual study of a few literary texts with some considerations of methods of literary criticism. The course

is designed to give the student insight into various ways of interpreting and understanding literary works so that his experience of literature in general may be enriched. One course. *Wardropper*

166. Spanish Realism. The growth of realism in Spanish literature of the nineteenth century. One course. *Davis*

167. Golden Age Literature: Cervantes. Emphasis on *Quijote*. One course. *Predmore and Cox*

168. Survey of Eighteenth Century Spanish Literature. Prose, poetry, and drama reflecting social, religious, and political ideas of the eighteenth century. One course. *Cox*

169. Literature of Contemporary Spain. Trends in the post-Civil War novel, theater, and poetry. One course. *Landeira*

170. The Picaresque Novel. One course. *Murray*

176. Advanced Conversation. This course is designed to develop facility of expression through constant drill on vocabulary and conversational idiom. Time will be devoted to a review of the essentials of Spanish syntax. Prerequisite: Spanish 97 or permission of the instructor. One course. *Landeira and Staff*

177. Advanced Composition and Syntax. Fundamental difficulties in the language; practice in writing idiomatic Spanish; exercises in translation from English to Spanish. For students who have a satisfactory command of Spanish grammar and fair conversational ability. Prerequisites: Spanish 176 or permission. One course. *Davis*

181-182. Spanish. An intensive introduction to the language open only to students who have achieved proficiency in another language. Two courses. *Miller*

181P-182P. Preceptorial. Elective preceptorial for students enrolled in Spanish 181, 182.

191, 192. Independent Study. Directed reading and research. Open only to highly qualified juniors by permission of the department. Two courses.

193, 194. Independent Study. Directed reading and research. Open only to highly qualified seniors by permission of the department. Two courses.

251. The Origins of the Spanish Novel. A critical study, based on close readings and discussions, of selected examples of the principal genres of the early novel: *Amadis de Gaula*, Diego de San Pedro's *La carcel de amor*, the *Abencerraje*, the *Lazarillo*, Montemayor's *Diana*. One course. *Wardropper*

252. Spanish Lyric Poetry Before 1700. A critical study, based on close reading and discussion, of selected poems of the Middle Ages, Renaissance, and Baroque. Special emphasis on the *Razon de amor*, la poesia de tipo tradicional, and Santillana; on Garcilaso, San Juan de la Cruz, Fray, Luis de Leon, and Herrera; on Gongora and Quevedo. One course. *Wardropper*

253. The Origins of the Spanish Theatre. A study of the evolution of the Spanish theater from the *Auto de los Reyes Magos* (twelfth century) to the end of the sixteenth century. The idea of the theater as dramatic poetry will be stressed;

close reading of texts by Gomez Manrique, Encina, Gil Vicente, Torres, Naharro, Lope de Rueda, Juan de la Cueva. One course. *Wardropper*

255. Modern Latin American Poetry. The coming of age of Latin American poetry in the nineteenth and twentieth centuries. One course. *Fein*

256. Contemporary Latin American Literature. Trends in Latin American literature after the Modernist movement. Analysis of significant works in various genres. One course. *Fein*

257. Old Spanish Language. The historical development of the language. Illustrative readings. One course. *Davis*

258. Old Spanish Literature. An introduction to medieval Spanish literary texts. One course. *Davis*

259. Spanish Phonetics. A phonemic approach to the study of Spanish sounds. Remedial pronunciation drills with special emphasis on rhythm and intonation. Readings in current studies of phonology. Prerequisite: Spanish 176 or permission. One course. *Predmore*

261. Nineteenth-Century Novel. A study of literary trends in the last half of the nineteenth century. Readings will be selected from the novels of Valera, Pereda, Galdos, Pardo Bazan, Blasco Ibanez, and their contemporaries. One course. *Davis*

262. Galdos. Works selected from the *Novelas contemporaneas*, the *Episodios nacionales*, and his drama. One course. *Davis*

265. Golden Age Literature: Cervantes. The life and thought of Cervantes with special emphasis on his *Quijote*. One course. *Predmore and Wardropper*

266. Golden Age Literature: The Drama. A study of the chief Spanish dramatists of the seventeenth century with readings of representative plays of this period. One course. *Wardropper*

275. Contemporary Spanish Literature: Essay and Lyric Poetry. A study of the revision of national values and literary expression in the twentieth century with particular reference to the crisis of 1898 and to the enrichment of the Spanish tradition through extrapeninsular influences. One course. *Predmore*

276. Contemporary Spanish Literature: Novel. A study of tradition and innovation in the twentieth century Spanish novel with emphasis on the novels of Unamuno, Baroja, Valle Inclan, and Perez de Ayala. One course. *Predmore*

ROMANCE LANGUAGES

211. Approaches to Romance Literature. One course. *Staff*

218. The Teaching of Romance Languages. Evaluation of objectives and methods; a study of the practical problems involved in teaching these languages on the elementary, secondary, and college level; analysis of textbooks, special foreign language programs, audiovisual aids; critical examination of modern techniques in written and oral testing. One course. *Hull*

DEPARTMENTAL MAJOR

Prerequisite. French or Spanish 64 or proficiency.

Major Requirements. Literature major: a total of eight courses (above 64), no fewer than five literature courses, and no fewer than two language courses. The literature courses must represent at least three of the six historical periods (Medieval, Renaissance, seventeenth, eighteenth, nineteenth, twentieth centuries for French and Medieval, Renaissance, seventeenth, eighteenth, nineteenth, twentieth, and Spanish American, for Spanish.)

Language Major. A total of eight courses, no fewer than four language courses (for French, from 97, 98, 127, 209, 210; for Spanish, from 97, 176, 177, 259) and no fewer than two literature courses.

In order to give perspective to a student's program, majors in Romance languages will normally select, with the approval of the major adviser, appropriate courses from such fields as: (1) other languages and literature; (2) history; (3) philosophy; (4) appreciation courses in music and art; and (5) linguistics.

Russian

For courses in Russian, see *Slavic Languages and Literatures*.

Slavic Languages and Literatures

Associate Professor Krynski, *Chairman*; Assistant Professor H. Pavlov, *Director of Undergraduate Studies and Supervisor of Language Instruction*; Associate Professor Jezierski; Assistant Professors Foster, M. Pavlov, and Shonek

1-2. Elementary Russian. Introduction to understanding, speaking, reading, and writing. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. Two courses. *Staff*

63-64. Intermediate Russian. Intensive classroom and laboratory practice in spoken and written patterns. Reading in contemporary literature. Prerequisite: Russian 1-2, or two years of high school Russian. Two courses. *Staff*

66. Russian Conversation. For the development of fluency in spoken Russian through the acquisition and retention of an extensive vocabulary. Discussions will deal with topics of contemporary interest. May be taken concurrently with or upon completion of Russian 64 or equivalent. One course. *Staff*

91. Introduction to Russian Literature of the Nineteenth Century. Conducted in Russian. Prerequisite: Russian 63-64 or equivalent. One course. *M. Pavlov*

92. Introduction to Russian Literature of the Twentieth Century. Conducted in Russian. Prerequisite: Russian 91. One course. *M. Pavlov*

91P, 92P. Preceptorial. Elective preceptorials for students enrolled in Russian 91, 92. *M. Pavlov*

105. The Russian Theatre and Drama. Russian drama from its beginnings to the present. Readings in English or Russian. One course. *Jezierski*

124. Masters of Russian Short Fiction. Includes Pushkin, Gogol, Tolstoy, Dostoevsky, Chekhov, and Babel. Readings in English. One course. *Jezierski*

179. Twentieth-Century Russian Prose. Modern prose in the original. Textual analysis of Russian prose since the turn of the century. Prerequisite: Russian 1-2, 63-64, or permission of instructor. One course. *Krynski*

180. Masterpieces of Russian Literature of the Nineteenth Century. Poems, plays, and prose by such authors as Pushkin, Turgenev, and Chekhov in the original. Prerequisite: permission of instructor. One course. *Krynski*

181. Modern Russian Poetry. The historical development of modern Russian poetry. Representative works of major recent Russian poets include Blok, Axmatova, Pasternak, Mandelstam, and Voznesensky. Prerequisite: at least three semesters of Russian or permission of instructor. One course. *Foster*

182. Revolution and Civil War in Russian Literature. Disintegration and reorganization of Russian society as reflected in Soviet and Russian emigre literature. Supplemented by pertinent films. One course. *Foster*

184. Soviet Writers of the 1960's. Poems, prose, and plays by Yevtushenko, Voznesensky, Sinyavsky-Tertz, Daniel-Arzhak, Solzhenitsyn, and others. Readings in English. Qualified students may do some readings in Russian. One course. *Krynski*

185. Vladimir Nabokov. The Russian and English novels, short fiction, plays, poetry, and criticism of Vladimir Nabokov. Readings in English. Qualified students may do some readings in Russian. One course. *Jezierski*

186. Non-Russian Slavic Literatures. Polish, Czech, Slovak, Serbian, Croatian, and Bulgarian authors, from the beginnings to recent times. Readings in English. One course. *Jezierski*

191, 192. Independent Study. Directed reading and research. Open only to highly qualified students by permission of the department. Two courses.

201, 202. The Novelists of Nineteenth-Century Russia. Development of the Russian novel against the European background, with emphasis on Dostoevsky and Tolstoy. Extensive readings in English or Russian. Two courses. *Krynski*

203. The Slavs: Literature and Culture, 1918-1939. Poland, Czechoslovakia, Yugoslavia, and Bulgaria; comparative study with attention to Soviet influences. Readings in English. One course. *Krynski*

204P. The Slavs: Literature and Culture, 1940-1970. Poland, Czechoslovakia, Yugoslavia, and Bulgaria; comparative study with special emphasis on the process of cultural de-Stalinization both in Eastern Europe and the Soviet Union. Readings in English. One course. *Krynski*

205. The Structure of Polish in Relation to Russian. Comparative and contrastive study of the two major Slavic languages. Emphasis on preparing students to read Polish literary texts. One course. *Krynski*

206. Readings in Contemporary Polish Prose in the Original. Stylistic analysis of aphoristic prose by Stanislaw Lec, philosophical allegories by Leszek Kolakowski and short stories by Slawomir Mrozek and Marek Hlasko. One course. *Krynski*

207P. Soviet Literature and Culture. Literature since 1917. Readings in

English or Russian from major works of prose, poetry, and drama. One course. *Jeziarski*

212S. Pushkin. A survey of his life and works, with attention given to his role as a precursor of modern Russian literature. Readings in English or Russian. Prerequisite: Russian 101 or the instructor's permission. One course. *Krynski*

215, 216. Advanced Composition and Syntax. Morphological and syntactic structure of modern Russian compositions based on literary topics. Prerequisite: Russian 91, 92 or permission of instructor. Two courses. *M. Pavlov*

225S. Leo Tolstoy. Life and works. One course. *Jeziarski*

227. Gogol. Life and works; short stories, dramas, and the novel. Readings in English, but students knowing Russian will do part of the reading in that language. One course. *Jeziarski*

230P. Chekhov. Chekhov as a short story writer and his influence on the twentieth century Western short story. Close structural analysis of the plays of one of the greatest dramatists of all time. One course. *Foster*

232. Fyodor Dostoevsky. The major fiction of a leading nineteenth century Russian writer. One course. *Jeziarski*

233S. Ivan Turgenev. Novels, short stories, and drama of the great exponent of classical realism. One course. *Krynski*

236S. Russian and Polish Romanticism. Prose, poetry, and drama of such major writers as Pushkin, Lermontov, Mickiewicz, and Krasinski against the background of the Romantic movement in Western Europe. One course. *Krynski*

DEPARTMENTAL MAJOR

Prerequisites. Russian 1-2 and 63-64, or equivalent.

Major Requirements. A minimum of eight courses in the department. All majors must take the following four obligatory courses: Russian 91, 92, 215, 216, plus four courses in literature, two of which must be selected from the 200-level courses.

Students contemplating graduate work in the Slavic field may elect a more intensive program consisting of ten courses. A knowledge in depth of Russian literature, or some knowledge of Polish language and/or literature, will facilitate admission to graduate school and subsequent study in the field.

Sociology and Anthropology

Professor Back, *Acting Chairman*; Assistant Professor Hartford, *Director of Undergraduate Studies in Sociology*; Assistant Professor Bowers, *Director of Undergraduate Studies in Anthropology*; Professors Buettner-Janusch, Kerckhoff, La Barre, Maddox, McKinney, Myers, Preiss, Roy, Tiryakian, and Smith; Associate Professors Apte, Crocker, Fox, Palmore, Simpson, and Wilson; Assistant Professors Brehm, Casson, House, Mason, Murch, O'Barr, and Stone; Lecturer Winther

SOCIOLOGY

Sociology 91 or special permission of the instructor or the Director of Undergraduate Studies is a prerequisite for all sociology courses at the 200-level.

To provide a variety of educational experiences for the beginning student of sociology, the introductory course, *Introduction to Sociology: Concepts and Procedures*, has a variety of structures. In each, however, students learn basic approaches of sociology to social reality and some of the problems involved in observing, describing, and analyzing facets of social life.

91. Sections of limited enrollment (maximum thirty-five). One course.
Staff

91D. Two lectures and one discussion section (no more than twenty students per section). One course.

91S. Taught as seminar, limited enrollment, open to invited freshmen only.
Simpson

132. Introduction to Sociological Research. Application of theories and methods of sociology; examination of several empirical studies dealing with social behavior. One course. *Preiss and Mason*

136. Sociology of Modern Africa. An introduction to the modernization of sub-Saharan Africa. Primary emphasis given to the nature and formation of colonial society, as well as to process of decolonization and its sources. One course. *Tiryakian*

139. Comparative Social Structure. Comparison of social phenomena in two or more societies. Sociological propositions, tested with American data and data from other societies. One course. *Murch and Wilson*

141. Introduction to Population and Human Ecology. This course provides an introduction to two macroscopic aspects of society. The size, distribution, and composition of populations, and the morphological aspects of collective life, are considered. One course. *Hartford and Myers*

142. The Sociology of Mass Communication. An analysis of the role of radio, the press, magazines, movies, and television in modern societies. An examination of the selective audiences, content characteristics, controlling elements, and organizational structure of the various media of mass communication. One course. *Smith*

143. Deviant Social Behavior. Analysis of deviant behavioral systems (illness, crime, delinquency) in terms of precipitating social factors, patterns and goals, remedial and counteracting controls. One course. *Preiss*

144. Political Sociology. Politics as social behavior involving change in institutions and structures; current national and local issues. One course. *Preiss*

145. Urban Sociology. Historical, demographic, and ecological materials are used to study urban society with respect to its institutions, interaction patterns, differentiation, integration disorganization, and decentralization. One course. *Myers and Smith*

146. Industry and Society. A study of industrial institutions in their interrelationships with other forms of social behavior in the broad cultural setting of Western civilization. Attention will center upon analysis of specific social problems resulting from the impact of industrial change. One course. *Roy*

- 147. The Black in the City.** A comparative analysis of the situations and experiences of black people in urban settings with attention to class, caste, ethnic, social, and racial factors. One course. *Smith*
- 150. The Family.** Analysis of the American family as an institutionalized group and its relationship with other institutions and structural features such as social class and ethnic group. Special attention is devoted to methods of research in this area. One course. *Kerckhoff and Roy*
- 151. Sociology of Religion.** The religious factor and the social factor in religion. Major sociological theories and selected research studies. One course. *Tiryakian and Wilson*
- 154S. The Sociology of the Arts.** An analysis of the social relations of the world of the arts (painting and sculpture, music, and literature) with emphasis upon creative artists, art publics, art organizations, and art works as they function in their social-cultural milieux. One course. *Back*
- 155. Introduction to Industrial Sociology.** An analysis and appraisal of the various factors that affect human relations in industry. The interpersonal and inter-group relationships within the individual industrial unit which determine its efficiency as an economic and social institution and the social conditions in the community as they affect social relations. One course. *Roy*
- 156. The Contemporary Woman: History and Prospects.** For description see Interdisciplinary Course 156.
- 159. Black and White Relations in America.** The history and changing nature of interaction between Blacks and Whites, including the sources and consequences of discrimination, integration, and Black power. One course. *Palmore*
- 172. Collective Behavior.** Rumor and contagion as general processes; collective expression such as riots, protests, and behavior in disaster. Focus on contemporary Western society. One course. *Kerckhoff*
- 173. Social Movements.** Social movements as agents of change. Structure and development of protest groups. One course. *Wilson*
- 182. Introduction to Sociological Theory.** Images and theories developed to understand social behavior; a survey of current issues. One course. *Wilson and Murch*
- 185, 186. Junior Tutorial.** Prerequisites: Sociology 91 (or 91D or 91S) and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*
- 195S, 196S, 197S, 198S. Senior Seminar in Special Topics.** Four courses. *Staff*
- 241. Social Stratification.** The nature of hierarchical and vertical differentiation in the economic, political, and prestige structures in modern societies. The interrelationship of class, status, and power strata and their influence on social institutions, personality structure, and group and individual behavior. One course. *Roy and Mason*
- 242. The Sociology of Occupations and Professions.** The social signifi-

cance of work. Analysis of forces changing the contemporary occupational structure, typical career patterns of professions and occupations, and the social organization of occupational groups. One course. *Roy*

243. Population Dynamics and Social Change. Introduction to demographic analysis. The relationship between the demographic structure of society and its social organization. One course. *Hartford and Myers*

251. The Sociology of Modernization. Changes, obstacles to change, and structural strains which occur in kinship, stratification, and bureaucracy, and the role of the military, occupations and works, communications, values, and ideologies during modernization. Special reference to Asian societies. One course. *Tiryakian and Murch*

253. Social Institutions. The study of particular institutions and the social movements out of which they developed, with emphasis on the development of general propositions concerning the nature, function, and importance of institutions in society. One course. *Staff*

255. Race and Culture. A comparative study of race relations in world perspective developed around such themes as race and personal identity, the geography and ecology of race relations, the idea of race, and race conflict. One course. *Staff*

259. Religion and Social Change. The role of religion in significant social changes in Western and non-Western societies; non-institutional phenomena (charisma, prophecy, messianism, revivals, glossolalia). Prerequisite: either Anthropology 264, Sociology 151, or the equivalent. One course. *Tiryakian and Wilson*

272. The Socialization Process. Universal societal requirement for continual replacement of socialized personnel. Variations in socialization by position in the social structure (class, caste, urban-rural) and contributions made by various socialization agencies (family, school, peer groups, mass media). Western society is the focus of study. One course. *Kerckhoff*

275. Social Attitudes and Individual Behavior. Such issues as the following are considered: the importance of symbolic interaction, the development of the "Self," the social structuring of the socialization process, individual movement within the social structure, and the importance of membership groups and reference groups. One course. *Back and Kerckhoff*

278. Social Structure and the Life Cycle. A study of the relationship between age as a social characteristic and social interaction, with particular reference to adolescence and old age. One course. *Maddox*

295. Methodology in Sociology. Considerations of the nature of scientific method, as well as alternative paths to knowledge, as they apply to sociology. Conceptualization, hypothesis formation, and definition. The research process as a decision-making situation both on the general level of research design and the specific level of special techniques. The process and logic of data analysis. Relations of theory and research are stressed. One course. *Smith and Mason*

297. Statistical Analysis in Sociology. Such techniques as zero and higher order linear and curvilinear correlation, partial correlation, analysis of variance and covariance and factorial design are studied. When possible, analogous nonparametric techniques are also considered. Prerequisite: Mathematics 233 or equivalent course or permission of the instructor. One course. *Hartford and Brehm*

Departmental Major in Sociology

Prerequisite. Sociology 91.

Major Requirements. Seven courses in the department above 91, including Sociology 132 and either one 200-level course or one senior seminar.

A sociology major normally takes at least four related courses in one of the following departments: Economics, Education, History, Mathematics, Political Science, or Psychology.

ANTHROPOLOGY

93. General Anthropology. Origins and distribution of mankind; primate evolution; a survey of human paleontology and human biology, pre-history and language; and the origins of human social organization and culture. One course. *Staff*

93D. Same course as 93 with discussion section included. One course. *Staff*

93S. Same course as 93 taught as seminar. One course. *Staff*

94. Cultural Anthropology. A study of the dynamics of culture and society; form and function of social institutions. Emphasis is upon primitive societies. One course. *Staff*

94D. Same course as 94 with discussion section included. One course. *Staff*

94S. Same course as 94 taught as seminar. One course. *Staff*

101, 102. Introduction to the Civilization of Southern Asia. (See Interdisciplinary Course 101, 102.)

120. Comparative Language. Anthropological study of human and pre-human non-verbal communication; sound, sense, and structure in Indo-European and other languages; techniques of reconstructing the ethnographic past (philology, glottochronology, paleolinguistics); and an introduction to psycholinguistics and sociolinguistics. One course. *LaBarre*

121, 122. World Ethnography. The major cultural areas of the world in terms of the "universal culture pattern." Ethnographic records are used to illustrate and appraise non-Western man's environment. Two courses. *Staff*

124. Peoples of the World: American Indian. A comprehensive survey of the Indians of North and South America, including a study of origins and prehistory, archaeology, racial affiliations, languages, material culture, social and political organization, economics, and religion, discussed in terms of the "culture area." One course. *La Barre and Stone*

125. Peoples of the World: Africa. A survey of the indigenous cultures and societies of Africa. Particular emphasis will be given to the study of kinship, politics, economics, religion, and sociocultural change. One course. *O'Barr*

126. Peoples of the World: Oceania. Selected problems in the development of pre-European and post-European cultures. The relationships between man and Pacific environments. One course. *Bowers*

128. Peoples of the World: Asia. A comprehensive survey focusing on the peoples and societies of South, Southeast, and East Asia, including the prehistoric,

ethnic, linguistic, religious, and political foundations of the complex civilizations; the response of traditional Indian, Chinese, and Japanese cultures to the West. One course. *Apte and Fox*

129. Peoples of the World: Middle East. Emphasis on language, kinship, economics, politics, and religion. One course. *Casson*

130. Cultural Change and Stability. Contemporary theories of culture change, especially those resulting from acculturation and from implementation of programs of technical and economic aid; a consideration of the factors significant in maintaining stability or stimulating change in traditional cultures. One course. *Staff*

134. Political Anthropology. Comparative study of conflict and political action. Decision-making as related to social structure and cultural values. Stateless, emergent, and underdeveloped societies. One course. *Crocker and O'Barr*

137. Comparative Social Organization. Social anthropological analysis of role structures and corporate groups in particular societies, and their relevance for understanding the historic process of civilization. Case study of social types and of the unique features of societies revealed by the comparative method. Prerequisite: Anthropology 94 or permission of the instructor. One course. *Fox, Stone, and Casson*

138. The Analysis of Mythology and Ideology. Relationships between social institutions and symbolic orderings as expressed in myths and cosmologies. Case materials and studies from both pre-literate and industrialized societies. One course. *Crocker*

140. The Analysis of Ritual and Drama. Relationships between social processes and symbol systems as expressed in such ritual activities as rites of passage and of affliction, sacrifice, shamanistic curing, divination, and witchcraft. Case materials and studies of collective rituals and dramatic forms in pre-literate and industrialized societies are utilized. Prerequisite: Anthropology 94, 138, or permission of the instructor. One course. *Crocker*

160. The Anthropology of Agriculture. Origins and distribution of cultivated plants, domesticated animals, and techniques of cultivation. The major agricultural regions of the world. Man-environment relations in contemporary subsistence-oriented agricultural systems, particularly in the humid tropics. One course. *Bowers*

162. Introduction to Ecological Anthropology. Behavioral and other biological adaptations in human populations; man-dominated ecosystems in the primitive world. Prerequisite: Anthropology 93. One course. *Bowers*

164. Peasantry and Peasant Movements. The genesis of peasant movements. Forms of peasant protest and its role in the economic, political, and ritual life of societies. Case studies from Western and Eastern societies, past and present. Prerequisite: Anthropology 94 or permission of instructor. One course. *Winther and Fox*

185S, 186S. Junior Tutorial. Prerequisites: Anthropology 94 and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*

193. Independent Study. Directed reading and research. Open only to highly qualified students in the senior year, by permission of the Director of Undergraduate Studies. One course. *Staff*

195S, 196S. Senior Seminar. Prerequisites: Anthropology 94 and any two 100-level courses in anthropology, and permission of the Director of Undergraduate Studies. Half-course or one course. *Staff*

199S. The Changing South. (See Interdisciplinary Course 199.)

220S. Society and Culture in India. The basic features of Indian cultures and societies from an anthropological perspective. The impact of selected technological and social changes upon the individual, caste, and community. One course. *Fox*

222S. Topics in African Anthropology. Current research problems in African anthropology, illustrated by a study of tribal societies, in terms of contemporary theories about culture and society. One course. *O'Barr*

231. Human Evolution I. Evolutionary biology of the primates. Anatomical, behavioral, and molecular adaptations of fossil and living primate populations including *Homo sapiens*. Prerequisite: a course in biology; or consent of instructors. (Also listed as Zoology 131.) One course. *Buettner-Janusch and Cartmill*

232. Human Evolution II. Human population and biochemical genetics. Analysis of the effects of natural selection on past and present human populations. Prerequisite: Anthropology 231 (Anatomy 231, Zoology 131) or consent of instructor, or a course in genetics. (Also listed as Zoology 132.) One course. *Buettner-Janusch*

236. Human Genetics. Emphasis upon the uniqueness of studies in human clinical, biochemical, and population genetics. (Also listed as Anatomy 236, Zoology 236, and under the Genetics Program in the *Bulletin of the Graduate School*.) Prerequisites: Anthropology 231 (Anatomy 231, Zoology 131), or an elementary course in biology including genetics, or permission of instructor. One course. *Buettner-Janusch*

238S. Language and Society. An introduction to the study of language and society. Universal features of language, language as a mirror of society and social perception through language, language as a coding system, linguistics and anthropology, applied linguistics. One course. *Apte and Casson*

240S. Indo-Aryan Linguistics. Historical development of Indo-Aryan languages from Sanskrit to the modern period. A comparative analysis of modern Indo-Aryan languages as regards phonology, morphology, syntax, and lexicon. Impact of non-Indo-Aryan languages on the structure and lexicon of Indo-Aryan languages. Prerequisite: Linguistics 101 or permission of instructor. One course. *Apte*

242S. Topics in Prehistory. Anthropological issues derived from archeological and early historical investigations. Prerequisite: Anthropology 93 and 94 or equivalent. One course. *Bowers*

249S. Economic Anthropology. Economic organization and behavior in pre-literate, peasant, and transitional societies; analysis of ownership and distribution.

The relationship of economic processes to norms and institutions such as markets. One course. *Crocker, Fox, and O'Barr*

260S. Linguistic Anthropology: Phonemics. Application of descriptive linguistics to analysis of language; concentration on the sound system of a South Asian language, and other non-Western languages. Prerequisite: permission of the instructor. One course. *Apte and Casson*

261S. Linguistic Anthropology: Morphology and Syntax. Application of descriptive linguistics to analysis of language; concentration on the grammatical system of a South Asian language, and other non-Western languages. Prerequisite: Anthropology 260 or permission of the instructor. One course. *Apte and Casson*

262S. Anthropology of Law. Legal decision in pre-literate societies. The interrelationships of law, ritual, and myth. One course. *Crocker*

263S. Primitive Art and Music. A comparative ethnological study of non-European art and music; sufficient technical background will be provided for non-specialist students. One course. *La Barre*

264S. Primitive Religion. The ethnology, social functions, and the socio-psychological meanings of religion in primitive societies. One course. *La Barre*

265S. Personality and Society. The sociology and social psychology of human personality, its origins in the primary group, its nature and varieties, and its integrations into secondary group institutions. One course. *La Barre*

266S. Personality and Culture. The influence of culture patterns and social institutions upon character structure, socialization of the individual, and the dynamics of human personality. Comprehensive anthropological materials will be drawn upon. One course. *La Barre*

276S. Analysis of Kinship Systems. Primitive relationship categories as related to legal norms and ritual and social groupings. Theoretical issues and contrasting approaches to the analysis of social classification terminologies. One course. *Crocker and Casson*

278S. Special Topics in Political Anthropology. Current research problems in political anthropology. Topic(s) will change each semester. Prerequisite: Anthropology 134 or permission of instructor. One course. *O'Barr*

280S, 281S. Seminar in Selected Topics. Special topics in methodology, theory, or area. Prerequisite: permission of the instructor. Two courses. *Staff*

291, 292S. Anthropological Theory. Theoretical, methodological, and comparative issues in anthropology. Two courses. *Crocker and Fox*

Departmental Major in Anthropology

Prerequisite. Anthropology 93-94.

Major Requirements. Six courses in the department above 93-94, including at least two senior-graduate courses.

An anthropology major normally takes at least four related courses in departments approved by his anthropology adviser. Such courses are usually in the Departments of Anatomy, Art, Botany, Economics, History, Mathematics, Political Science, Psychology, and Zoology.

Spanish

For courses in Spanish, see *Romance Languages*.

University Courses

University courses are offered by senior named professors, as electives for juniors and seniors, in a form free from ordinary class restrictives.

199.1. Comparative Politics: Western Europe. One course. *Cole*

199.5. Science, Society, and Education. One course. *Kramer*

Zoology

Professor Fluke, *Chairman*; Associate Professor Ward, *Director of Undergraduate Studies*; Professors Bailey, Bookhout, Buettner-Janusch, Costlow, Gregg, Klopfer, Livingstone, Nicklas, Schmidt-Nielsen, and Wilbur; Associate Professors Barber, Gillham, Tucker, Vogel, and Wainwright; Adjunct Associate Professor Schmidt-Koenig; Assistant Professors Forward, Lundberg, Lutz, and Sutherland; Instructors Bernstein and McInnis

See *Biology* for listing of introductory courses.

56L. Developmental and Comparative Anatomy of Vertebrates. Lectures and laboratory on the embryology, anatomy, and evolution of vertebrate organ systems. Not open to students who have had Zoology 53. Prerequisite: introductory college biology. One course. *Lundberg*

71. Heredity and Society. An introduction to genetics, with emphasis on the effects of environment and heredity upon the individual and population. A student may not receive credit for both Zoology 71 and 180. Prerequisite: introductory college biology or consent of the instructor. One course. *Ward*

95S, 96S. Undergraduate Seminars. One course maximum except with permission of the Director of Undergraduate Studies. *Staff*

103L. Principles of Ecology. An introduction to the study of organisms in natural habitats, with particular attention to the growth of animal populations, the chemical role of organisms, energy flow through food chains, and the development of ecological systems through geologic time. Prerequisites: introductory college biology and Mathematics 31. Lectures and laboratories. One course. *Livingstone*

120L. Ornithology. Lectures, laboratory, and field trips dealing with the classification, adaptations, and natural history of birds. Prerequisite: introductory college biology; Zoology 56 is recommended. One course. *Bailey*

131. Human Evolution I. Evolutionary biology of the primates. Anatomical, behavioral, and molecular adaptations of fossil and living primate populations including *Homo sapiens*. Prerequisite: a course in biology; or consent of instructors. (Also listed as Anatomy 231 and Anthropology 231.) One course. *Buettner-Janusch and Cartmill (Anatomy)*

132. Human Evolution II. Human population and biochemical genetics. Analysis of the effects of natural selection on past and present human populations. Prerequisite: Zoology 131 (Anatomy 231, Anthropology 231) or consent of in-

structor, or a course in genetics. (Also listed as Anatomy 232 and Anthropology 232.) One course. *Buettner-Janusch*

151. Principles of Physiology. An introductory survey. Prerequisites: introductory college biology and a year of chemistry. One course. *Tucker*

151L. Principles of Physiology. Same course as 151 except laboratory included. One course. *Tucker*

169L. The Marine Environment. For description see Marine Sciences.

171S. Marine Sciences Seminar. For description see Marine Sciences.

174L. Animal Diversity. Form and function. Not open to students who have had 275. Lectures and laboratories. Prerequisite: introductory college biology. One course. *Wainwright*

180. Principles of Genetics. Structure and properties of genes and chromosomes, and evolution of genetic systems. (Also listed as Botany 180, Botany 280, and Zoology 280.) Prerequisites: introductory courses in biology, chemistry, and mathematics, or equivalent. One course. *Boynton (Botany), Gillham and Others of the University Program in Genetics*

180L. Principles of Genetics. Same course as 180 except laboratory included. One course. *Boynton (Botany), Gillham and Others of the University Program in Genetics*

186. Evolution. Processes of adaptation and evolution in individuals, populations, and genetic systems. (Also listed as Botany 186, Botany 286, Zoology 286 and under the University Program in Genetics.) Not open to students who have had Zoology 109 or Botany 240. Prerequisite: genetics or consent of the instructor. One course. *Antonovics (Botany) and Lundberg*



186L. Evolution. Same as 186 except laboratory included. One course. *Antonovics (Botany) and Lundberg*

191T, 192T. Independent Study. For senior and junior majors with permission of the Director of Undergraduate Studies and the supervising instructor. Three courses maximum. *Staff*

195S, 196S. Undergraduate Seminars. Two courses maximum except with permission of the Director of Undergraduate Studies. *Staff*

197S, 198S. Undergraduate Seminars. Do not satisfy major or distributional requirements. One course maximum except with permission of the Director of Undergraduate Studies.

For Seniors and Graduates

201. Animal Behavior. Emphasis on recent physiological and developmental studies. Prerequisites: physiology, genetics, and evolution, or consent of instructor. One course. *Klopper*

201L. Animal Behavior. Same course as 201 except laboratory included. One course. *Klopper*

203L. Marine Ecology. Class discussions on selected papers, and field projects; practice in scientific writing and use of computers in ecology. Prerequisites: a course in general zoology, invertebrate zoology, or an appropriate equivalent, and a year of mathematics; some knowledge of statistics will be helpful. (Given at Beaufort.) Two courses. *Sutherland*

205. Elements of Theoretical Biology. An introduction to elementary mathematical biology, conceived as the study of axiomatized mathematical theories and their biological models. Prerequisites: introductory college biology and mathematics, or consent of instructor. One course. *Gregg*

212L. Marine Membrane Physiology. Physiology of marine and estuarine organisms, with emphasis on cellular transport and electrophysiological processes. Include laboratory work on functions, mechanisms, and comparative aspects of ionic and osmotic regulation in marine plants and animals. Prerequisite: permission of instructor. (Also listed as Physiology 212). Given at Beaufort. Two courses. *Gutknecht, Schoffeniels, Wachtel, and Staff (Physiology)*

213. Ecological Oceanography. Population ecology and energy relationships of life in the open ocean. Lectures, seminars, and some sea-time. Prerequisites: courses in ecology or invertebrate zoology, chemistry, and calculus; differential equations is strongly recommended. One course. *Staff*

214L. Biological Oceanography. Composition in time and space of marine biosphere in relation to descriptive marine chemistry, physics, and geology. Some work at sea aboard the research vessel. Prerequisites: a course in invertebrate zoology, ecology, marine biology or an appropriate equivalent, chemistry through organic, and one year of physics and mathematics. (Given at Beaufort.) Two courses. *Barber*

216L. Limnology. Lakes, ponds, and streams; their origin, development, geochemistry, energy balance, productivity, and the dynamics of plant and animal communities living in them. Lectures, field trips, and laboratory work. Usually

offered in alternate years. Prerequisites: introductory college biology, chemistry, physics, and Mathematics 31, or permission of instructor. One course. *Livingstone*

224L. Vertebrate Zoology. Life histories, adaptations, ecology, and classification of vertebrate animals. Lectures and laboratories. Prerequisite: Zoology 56. One course. *Bailey*

229. Morphogenetic Systems. Lectures on the interplay of theory and experiment in twentieth century developmental biology. Prerequisite: introductory college biology. One course. *Gregg*

229L. Morphogenetic Systems. Same course as 229 except laboratory included. One course. *Gregg*

236. Human Genetics. Emphasis upon the uniqueness of studies in human, clinical, biochemical, and population genetics. (Listed also as Anatomy 236, Anthropology 236 and under the Genetics Program). Prerequisite: Zoology 131 (Anatomy 231, Anthropology 231) or an introductory course in college biology including genetics, or permission of the instructor. One course. *Buettner-Janusch*

238L. Systematic Zoology. Theory and practice of collection, identification, and classification of animals. Lectures and laboratories. Prerequisite: introductory college biology. One course. *Bailey*

240L. Chemical Oceanography. Physicochemical properties of seawater. Lectures, laboratory work, and field trips. Prerequisite: a year of analytical or physical chemistry, an introductory course in general or physical oceanography or permission of the instructor. (Also listed as Chemistry 240.) (Given at Beaufort.) Two courses. *Staff*

242L. Cytological Materials and Methods. General cytological analysis, with emphasis on chromosome studies using current optical, cytochemical, and other experimental techniques. Prerequisite: Zoology 243 or equivalent, and permission of instructor. Half-course. *Nicklas*

243. Cytology. The structural and functional organization of cells. Lectures, readings, and conferences. Prerequisite: introductory college biology. (Also listed as Botany 243.) One course. *Anderson (Botany) and Nicklas*

244S. Topics in Cell Structure and Function. Advanced discussions of selected problems such as chromosome structure, mitosis, and cytological aspects of inheritance and development. Prerequisite: Zoology 243 (Botany 243) or equivalent and permission of the instructor. (Alternates with Zoology 288.) Half-course. *Nicklas and Moses (Anatomy)*

245. Radiation Biology. Actions of ionizing and excitational radiations on life processes; biological use of radioactive tracers; nucleonics. Prerequisites: college physics, mathematics, and chemistry. One course. *Fluke*

245L. Radiation Biology. Same course as 245 except laboratory included. One course. *Fluke*

246. Physical Biology. Physical principles of structure and function in large biological molecules and aggregates; applications to function at higher levels of organization, and to biological fitness. Prerequisites: college mathematics, chemistry, physics, and one biology course beyond the introductory course, or consent of instructors. One course. *Fluke and Wainwright*

248. Introductory Biochemistry. The chemistry of proteins, lipids, carbohydrates, nucleic acids, and the metabolic interrelationships of these compounds. The biochemical basis of photosynthesis, genetics, vision, nutrition, nerve conduction, and muscle contraction will also be considered. (Also listed as Biochemistry 247). Prerequisites: organic chemistry (second semester may be concurrent), college mathematics, or permission of instructor; Chemistry 61 is recommended. One course. *Fridovich (Biochemistry) and Webster (Biochemistry)*

250L. Physiological Ecology of Marine Animals. The physiological responses of marine animals to certain environmental factors and evolution. Lectures and laboratories. Prerequisite: a course in physiology. (Given at Beaufort.) Two courses. *Forward*

252. Comparative Physiology. The physiological mechanisms of animals studied on a comparative basis. Prerequisite: Zoology 151 or equivalent. One course. *Schmidt-Nielsen*

271. Cell Physiology. Physiological activities and mechanisms of cells and their components. Recent advances in cell biology. One course. *Wilbur*

271L. Cell Physiology. Same course as 271 except laboratory included. One course. *Wilbur*

274L. Marine Invertebrate Zoology. Structures, functions, and habits of invertebrate animals under normal and experimental conditions. Field trips included. Not open to students who have had 275. Prerequisite: introductory college biology. (Given at Beaufort.) Two courses. *Staff*

275L. Invertebrate Zoology. Lectures, readings and laboratory work dealing with free-living and parasitic invertebrates. Field trips to freshwater and marine habitats. Not open to students who have had 174 or 274. Prerequisite: introductory college biology. One course. *Bookhout*

276L. Comparative and Evolutionary Biochemistry. Lectures and discussion of the origin of life, evolution of the genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Prerequisite: consent of the instructor. (Also listed as Biochemistry 276.) (Given at Beaufort.) Two courses. *Sullivan (Biochemistry)*

278L. Invertebrate Embryology. Lectures, readings, and laboratory work dealing with rearing, development, and life history of invertebrates. Prerequisite: courses in vertebrate embryology and/or invertebrate zoology. One course. *Bookhout*

280. Principles of Genetics. Structure and properties of genes and chromosomes and evolution of genetic systems. Prerequisites: introductory courses in biology, chemistry, and mathematics, or equivalent. (Also listed as Botany 180, Botany 280, and Zoology 180.) One course. *Boynton (Botany), Gillham, and Others of the University Program in Genetics*

283. Developmental and Cellular Genetics. A seminar and lecture course devoted to current literature. (Also listed as Botany 283 and under the University Program in Genetics.) Prerequisites: Zoology 180 or 280 or equivalent and consent of instructor. Half-course. *Boynton (Botany) and Gillham*

286. Evolution. Processes of adaptation and evolution in individuals, populations, and genetics systems. (Also listed as Botany 186, Zoology 186 and under the University Program in Genetics). Not open to students who have had Zoology 109 or Botany 240. Prerequisite: genetics or consent of the instructor. One course. *Antonovics (Botany) and Lundberg*

286L. Evolution. Same as 286 except laboratory included. One course. *Antonovics (Botany) and Lundberg*

288S. The Cell in Development and Heredity. A seminar on topics of current interest and controversy. (Alternates with Zoology 244.) Prerequisites: a course in genetics and permission of one instructor. (Also listed as Anatomy 288.) Half-course. *Counce (Anatomy), Gillham, and Staff*

295S, 296S. Seminar. Topics and instructors announced each semester. Half-course each. *Staff*

Genetics, The University Program. Genetics courses offered by the Department of Zoology are part of The University Program in Genetics; see announcement in this *Bulletin*.

Marine Laboratory. The following courses are given at Duke University Marine Laboratory, Beaufort, N. C.: 169, *The Marine Environment*; 171, *Marine Sciences Seminar*; 203, *Marine Ecology*; 214, *Biological Oceanography*; 240, *Chemical Oceanography*; 250, *Physiological Ecology of Marine Animals*; 274, *Marine Invertebrate Zoology*; 276, *Comparative and Evolutionary Biochemistry*. Consult Marine Sciences in this *Bulletin* for other offerings at the Duke University Marine Laboratory.

DEPARTMENTAL MAJOR

Prerequisites. Biology 11-12 or Biology 14 or consent of the Director of Undergraduate Studies.

Major Requirements. A minimum of eight courses, not including the above prerequisites. Of the eight courses, at least four must be zoology courses other than independent study and seminars, two of which must have related laboratory experience. Three of the remaining four courses ordinarily consist of courses in chemistry beyond organic chemistry or courses in other related departments beyond the introductory level. Acceptance of such courses for inclusion in the basic eight requires prior permission of the Director of Undergraduate Studies with the exception of Chemistry 160 and any mathematics course beyond Mathematics 31 and 32. (Members of classes entering prior to 1972 may graduate under these regulations if they wish.)

Departmental Handbook for Majors. Any student who is considering a zoology major should obtain a copy of this handbook from the office of the Director of Undergraduate Studies. It describes the advising system, typical courses of study, special programs, and interests and background of the faculty.

School of Nursing

Professor Wilson, *Dean*; Professors Fortune, Gratz, Jacobansky, Minniear, and Stone; Associate Professors Horton, Norville, Reckless, and Whitner; Assistant Professors Blackwell, Brundage, Bullock, Davenport, Dery, Dietz, Harris, Ingram, Persing, Pounds, Turner, Tyler, and Young; Instructors Bourbous, Breedlove, Gelein, Lamper, and Long

97, 98. Human Ecology I and II. An interdisciplinary course in the natural sciences covering the impact of a changing physical and biological environment upon man. Two courses. *Gratz*

101-102. Theoretic and Scientific Bases of Nursing Practice. Builds upon courses in human ecology to explore major theories of man's normal adaptive responses and his responses to threats to his health. Multicausal factors and gradients of disease are considered from the framework of major assaults to man's integrity: excesses and deprivation, infection, trauma, endocrine imbalance, malformations, and neoplasms. Two courses. *Staff*

103-104. Development of Nursing Skills and Attitudes. Correlated with Nursing 101-102 by selection of patients as exemplars of man responding to assaults. Students will be giving nursing care to these patients of all ages in a variety of settings. Likenesses and differences will be shared in weekly seminar. Nursing practice will encompass the development of psychomotor skills essential to the process of nursing. Four courses. *Staff*

151. Functional Aspects of Nursing Practice. Theories, practices, and constraints influencing functional roles in nursing practice, e.g., economics and systems of health care, organization and administration of agencies and institutions delivering health care, legal protection, and constraints of the practitioner. One course. *Staff*

151P. Preceptorial. Preceptorial with practitioner in a selected service or agency. No credit.

152. Senior Independent Study. To be developed to effect the student's goals. May be primarily functional or clinical, or it may be a combination of both. One course. Pass/Fail optional. *Staff*

153, 154. Distributive and Episodic Nursing Practice. Continuation of Nursing 103-104 into the senior year. One semester the focus is on the care of individuals and groups of patients in crises which require rapid and/or crucial nursing decisions. The other semester the focus is on prevention of disease and maintenance of health. Opportunities will be provided for students to have continuous care of persons and families. Each student will have learning experiences with patients in each of the major clinical areas: medical, surgical, psychiatric, obstetric, pediatric, and community health nursing. Four courses. *Staff*

161. Advanced Human Physiology. An in-depth study of selected physiological processes significant to the health needs of man. Emphasis is upon those aspects of physiology that are reflected in patient care problems requiring effective nursing intervention. One course. (Pass/Fail.) *Gratz*

163S. Suicidology and Crisis Intervention. Exploration of theories related to destructive behavior, and methods for intervening and managing individuals and families before, during, or following such periods. Clinical practice will be provided for applying theories and techniques. Prerequisite: permission of instructor. One course. *Breedlove*

165S. Introduction to Group Therapy. Introduces students to theories and methods of group therapy and provides opportunity to develop beginning skills in analyzing the group process and promoting therapeutic interaction within groups.



Includes clinical experience and group supervision within selected settings. (Pass/Fail.) One course. *Blackwell*

167S. Nursing in Poverty and Health. A series of seminars and films designed to acquaint the student with a diversity of perceptions and observations germane to an understanding of the relationship between poverty and health. A variety of clinical experiences will be made available for student selection. (Pass/Fail.) One course. *Long*

179. Nursing and Renal Disease. Planned experience providing nursing care for patients with clinical disturbances of renal function and hypertension utilizing current treatment modalities in a variety of settings. Seniors and second semester juniors. (Pass/Fail.) One course. *Brundage*

183S. Introduction to Methods of Research in Nursing. Students will engage in critical analysis of research in nursing and study implications for nursing practice and research. Prerequisites: basic statistics and Nursing 103, or permission of instructor. (Pass/Fail optional.) One course. *Whitner*

187. Patient Evaluation. A study of the historical development of disease process through methods and techniques of eliciting health history and physical examination. The relationship of historical and physical data is demonstrated by repeated experiences with in-hospital patients. Seniors and second semester juniors. (Pass/Fail.) One course. *Wilson and Howard*

189S. Psychiatric Nursing. Focuses on dynamic psychiatric nursing and provides opportunities for the student to increase the depth of her knowledge of and her skill in applying concepts of psychiatric nursing intervention in selected settings. Prerequisite: Nursing 154; may be taken concurrently. (Pass/Fail.) One course. *Bullock*

192. Optional Independent Study. May be used to develop protocol for on- or off-campus study. Varying course credit. *Staff*

The School of Engineering

ENGINEERING (INTERDEPARTMENTAL)

11. Introductory and Computer Graphics. Elements of engineering graphics as a means of visualizing and communicating engineering projects. Sketching and drawing techniques to help the engineer illustrate and convey his ideas. Graphical solution of algebraic and calculus problems. Alignment charts and nomograms. Half-course. *Coffin*

21. Survey of Engineering. A course designed to assist the beginning engineering student in obtaining a general view of the profession of engineering, from first college course to ultimate practice of engineering; in gaining a better understanding of the role of the engineer in society; and in relating the various aspects of his academic program to his educational-vocational goals. Two class meetings per week. Half-course. *Meier*

31. Computers in Engineering. Introduction to use of digital computers in engineering. Attributes of digital computer systems; program languages, flow charts; numerical analysis, including approximation and interpolation, searches and maximization, linear equations; applications to engineering; introduction to decision processes in engineering, including linear programming, optimization network methods; punched card operation; graphical output. Not open to students who have completed Engineering 32, Math 51, or ME 31. One course. *Clough and Utku*

32. Computers in Engineering. Introduction to use of digital computers. Computer systems; algorithms, flow charts; programming, Fortran IV language. Applications to curve fitting, numerical integration, analysis of force systems and their equilibrium, and solution of linear equations. Not open to students who have completed Engineering 31, Math 51, or ME 31. Half-course. *Clough and Utku*

72. Introduction to System Dynamics. Unified treatment of mechanical, electrical, fluid, and thermal dynamic systems. Formulation and solution of differential equations; operators, transfer functions, and complex variables. Energy concepts for multiport system analysis. Simulation and analog solution of a variety of engineering problems. Prerequisites: Physics 51 and Math 32. One course. *Wright and Macduff*

75. Mechanics of Solids. Analysis of force systems and their equilibrium as applied to engineering systems. Stresses and strains in deformable bodies; mechanical behavior of materials; applications of principles to static problems of beams, torsion members, and columns. Selected laboratory work. Not open to students who have completed CE 12 (see CE 73). Prerequisite: Physics 51 and Math 32. One course. *Arges, Palmer, and J. F. Wilson*

83. Structure and Properties of Solids. An introduction to materials science and engineering, emphasizing the relationships between the structure of a solid and its properties. The atomic and molecular origins of electrical, mechanical, and chemical behavior are treated in some detail for metals, alloys, polymers, ceramics, glasses, and composite materials. Prerequisites: Chemistry 1 and Math 31. One course. *Shepard, Pearsall, Clark, and Gerstle*

104. Heat Transfer and Thermodynamics. Fundamentals of heat transfer; multidimensional and unsteady conduction, convection, radiation, combined modes, internal heat generation. Introduction to classical thermodynamics; first and second law, properties, compressible flow, psychrometrics. Prerequisites: Physics 52 and Math 74. One course. *Elsevier and Kenyon*

122. Transport Phenomena. A unified treatment of momentum, energy and mass transport from the continuum viewpoint, emphasizing the formulation and solution of engineering problems. Conservation laws, constitutive equations, their combinations, and methods of problem solution. Prerequisite: Math 74. One course. *Chaddock*

123. Dynamics. An introduction to the principles of particle and rigid body dynamics, with engineering applications. Vector analysis used to describe the kinematics of motion in space and in a plane; the inertia tensor. Concepts of impulse-momentum and work-energy. An introduction to vibrations, wave motion, and Lagrange's equation. Prerequisites: Math 74 and Physics 51. One course. *Dvorak and J. F. Wilson*

145. Fluid Mechanics. Physical properties of fluids; fluid-flow concepts and basic equations; continuity, energy and momentum principles; dimensional analysis and dynamic similitude; viscous effects; applications, emphasizing real fluids. Selected laboratory work. Corequisite: Engineering 123 or ME 123. One course. *Muga and J. F. Wilson*

150. Introduction to Probability and Statistical Decision Theory. An introduction to decision-making under uncertainty with emphasis on the Bayesian approach to statistical decision theory. Elementary concepts of probability theory, elements of decision problems, decision rules, a priori probabilities, risk functions, estimation, and sequential decisions. Problems selected from several areas of applied statistical decision theory. Prerequisites: Math 32 and junior level standing. Credit can not be received for this course and for Management Sciences 60. One course. *Nolte*

168. Engineering Economic Analysis. Fundamentals of economic decision-making for alternative engineering designs. Mathematics of cost comparisons. Principles of optimization. Cost estimation and control. The identification, definition, and selection of optimal engineering systems with time dependent costs and benefits. Overall project evaluation models. Benefit-cost analysis, cost-effectiveness, and welfare economics. Applications from decision processes in engineering and planning with particular emphasis on public-works systems. Open to seniors only. One course. *Dajani*

169. Legal Aspects of Engineering. A course designed to introduce engineering students to those aspects of the law encountered in the practice of engineering. Subjects included are: contracts and specifications, real and personal property, torts, insurance, agency, equity, evidence, labor management, sales,



expert testimony, engineering registration, and ethics. Open to seniors only. One course. *Olive*

170. Patent Law for Engineers. A course designed to familiarize engineering students with the legal principles and procedures for protecting patentable inventions, such as drafting and analysis of specifications and claims, study of infringements, assignments, licenses, and record documentation. Open to seniors only. One course. *Olive*

173. Advanced Mechanics. Mechanical behavior of elastic, elastic-plastic, viscoelastic and viscoplastic materials. Analysis of stresses and strains in simple structural elements, such as bars, shafts, beams, shells, and pressure vessels made of time-dependent and time-independent materials. Static and dynamic loading. Mechanical properties of solids under high rates of strain. Introduction to fracture mechanics. Brittle and ductile fracture, fatigue. Prerequisite: Engineering 83 and Engineering 75 or CE 73. One course. *Dvorak*

183, 184. Projects in Engineering. Courses in which engineering projects of an interdisciplinary nature are undertaken. The projects must have engineering relevance in the sense of undertaking to meet human need through a disciplined approach under the guidance of a member of the engineering faculty. Prerequisite: approval of instructor. Two courses. *Engineering Faculty*

BIOMEDICAL ENGINEERING

Professor Pilkington, *Chairman*; Associate Professor Clark, *Director of Undergraduate Studies*; Professor Thurstone; Associate Professors Hills, Nolte, and Wachtel; Assistant Professors Barr and Hammond; Lecturer Wolbarsht

Biomedical engineering includes the application of concepts and methods in the physical, mathematical, and engineering sciences to biology and medicine. This definition covers a broad spectrum ranging from formalized mathematical theory through experimental science to practical clinical applications. The purpose of the undergraduate program in biomedical engineering is to permit students who plan to dedicate their professional careers to the biomedical area to prepare themselves adequately for graduate work in biomedical engineering, medicine, or biology. This program is flexible and can satisfy the requirements for entrance either to graduate work in engineering, physiology, biology, or to medical school.

Opportunities for student research are available in the following biomedical engineering laboratories: The Cardio-Respiratory Systems Laboratory includes a PDP-12 digital computer, a PAR signal averager, and an analog computer. Computer science techniques are utilized in acquiring, processing, and modeling biological data. Research in the Biomedical Materials Laboratory is directed toward the development of materials suitable for use in biological environments such as the vascular system; Biomedical Engineering in Pediatric Cardiology measures electrical activity of the heart in animals and humans, to increase the basic knowledge of the heart itself. The Optics and Acoustics Laboratories are employed for research and instruction in the biomedical application of these fundamental areas. Ultrasound instrumentation measures and images biological tissue structures. The Neural Networks Laboratory explores the communication of information between individual nerve cells in prototypical brains. Optical, mechanical, and electronic equipment is used in recording neural activity, and computational equipment is employed for data analysis and simulation.

112. Biological Systems Analysis. Theory of physical system modeling by differential equations with major emphasis on linear dynamic analysis. Selected biomedical applications. Prerequisites: BME 161 and Math 51. One course. *Pilkington*

161. Biomedical Measurements. A study of the basic principles utilized in biomedical data acquisition with applications to the measurement of specific physiological events. Selected laboratory work. Prerequisites: EE 63 or Engineering 72. One course. *Hammond*

172. Biomedical Transfer Processes. An introduction to unit operations and life systems with particular emphasis on biological interactions of artificial materials and prostheses, environmental studies, and hyperbaric exposure. One course. *Clark and Hills*

181. Biomedical Modeling. Introduction to biomedical modeling with particular emphasis on neural and cardiorespiratory systems exhibiting phenomena varying from cellular to the whole organism level. Prerequisites: BME 161 and 112. One course. *Wachtel*

191-192. Projects in Biomedical Engineering. This course is available to seniors who express a desire for such work and who have shown aptitude for research in one area of biomedical engineering. Half-course to two courses. *Staff*

201. Introductory Biomedical Engineering I. Fundamentals of biomedical modeling with particular emphasis on neural and cardiorespiratory systems exhibiting phenomena varying from cellular to the whole organism level. Not open to students who have had BME 181. One course. *Wachtel*

202. Introductory Biomedical Engineering II. An introduction to biomedical transfer processes with particular emphasis on environmental studies, hyperbaric exposure, and the functions of artificial organs and prostheses. Not open to students who have had BME 172. One course. *Clark and Hills*

223. Biomedical Materials and Artificial Organs. The use of artificial organs to replace or augment natural function in pumping and oxygenation of blood, removal of nitrogenous wastes and other toxins, and prostheses which have mechanical, chemical, or cosmetic function. Emphasis is placed on molecular architecture of materials for use in biological environment and optimization of parameters of materials which determine their utility in varying applications. One course. *Clark*

265. Advanced Topics in Biomedical Engineering. Opportunity for study of advanced subjects related to programs within biomedical engineering tailored to fit the requirements of a small group. Prerequisite: approval of the chairman and the instructor under whom work will be done. One course. *Staff*

Departmental Major in Biomedical Engineering

The major requirements are included in the minimum total of 32 courses listed under general requirements and departmental requirements. The specific courses BME 112, 161, 172, and 181 must be included.

CIVIL ENGINEERING

Professor Vesic, *Chairman*; Professor Brown, *Director of Undergraduate Studies*; Professor Meriam; Associate Professors Dvorak, Muga, Palmer, Utku, and Wilson; Assistant Professors Arges, Clough, Dajani, and Vesilind; Adjunct Assistant Professor Coffin

Civil engineering may be defined as the art of conception, design, analysis, and building of constructed facilities. However, the modern civil engineer may find himself engaged in such complex problems as trafficability of planetary surfaces, environmental planning for a community, or optimization of an urban transportation system. There are seven major speciality areas of civil engineering at Duke. Environmental engineering deals with the quality of human environment as affected by water supply and wastewater treatment and disposal. Geotechnical engineering is concerned with interaction between engineering structures and the earth's crust as well as with structures constructed of earth as a material. Mechanics and materials engineering is the study of the behavior of materials under various conditions of loading and environment. Ocean engineering deals with the development and use of water and marine resources. Structural engineering is concerned with economical and safe design of engineering structures. Urban engineering encompasses a broad spectrum of integrated technological problems such as land and city planning and development, mass transportation, and public health and safety. Water re-

sources engineering is concerned with the usage, preservation, and replenishment of water resources. In addition, a student may elect a general program of civil engineering studies, or an interdisciplinary program of management sciences combined with civil engineering.

The civil engineering program at Duke is supported by the following laboratories for instruction and research. The Structural Engineering Laboratory has universal testing machines with capacities to 400,000 pounds; hardness testers; machines for testing torsion, fatigue, and impact. The department has facilities for the construction and testing of structural models, including medium-speed electronic equipment for the measurement and recording of strains and displacements. The Soil Mechanics Laboratory includes modern testing equipment and instruments, such as static and dynamic model testing accessories, as well as a triaxial shear apparatus, designed for testing soil and rock at confining pressures up to 100,000 pounds per square inch. The Fluid Mechanics Laboratory equipment includes a water wave flume with paddle-type variable frequency, constant amplitude, wave generator; and a variety of sensors. The Sanitary Engineering Laboratory is equipped for determining the characterization of waters and wastewaters and for applying biological, chemical, and physical treatment methods to improve their quality. The Materials Laboratory deals with the physical properties and stress-deformation characteristics of bituminous mixtures and concretes. The department has a representative collection of modern surveying equipment.

12. Statics. Analysis of force systems and their equilibrium as applied to engineering systems; algebraic methods used with vector notation where appropriate. Corequisite: Math 32. Half-course. *Arges and Meriam*

16. Surveying for Engineers. The theory and application of measurements required for planning, design, and construction of engineered facilities. Transit-tape and stadia surveys; differential and profile leveling; traverse computations. Laboratory included. Corequisite: Math 31. Half-course. *Arges*

73. Mechanics of Deformable Bodies. Stresses and strains in deformable bodies; mechanical behavior of materials and relation of stress to strain; applications of principles to static problems of beams, torsion members, and columns. Selected laboratory work. Prerequisite: CE 12. One course. *Arges*

116. Transportation Engineering. The role and history of transportation. Introduction to the planning and design of links, vehicles, and terminals of all transport modes. Basic characteristics of transportation technologies. Traffic operation and control. The transportation production function. Network structure. Economic evaluation and decision-making techniques. Prerequisite: junior or senior standing; consent of instructor for nonengineering students. One course. *Dajani*

117. Urban Systems Planning. The history and process of urbanization. Issues in urban and regional planning. Theories of urban form and development. Examination of multi-disciplinary relationships and the systems approach to comprehensive planning. Introductory model building and systems evaluation techniques. Planning and design methodologies in the land-use, transportation, public utilities, housing, and urban service sectors. Plan implementation and control issues of city management. Prerequisite: junior or senior standing; open with consent of instructor to students from all urban-related disciplines. One course. *Dajani*

123. Water Resources Engineering. Hydraulics of pressure conduits and measurement of flow, compound pipe systems, analysis of flow in pressure dis-

tribution systems, descriptive and quantitative hydrology applied to problems of irrigation and drainage, open channel flow, reservoirs and distribution system storage. Selected laboratory work. Prerequisite: Engineering 145. One course. *Muga*

124. Environmental Engineering. Qualitative and quantitative physical, chemical, and bacteriological characterization of water and wastewater. Introduction to water treatment processes, and wastewater collection, treatment and disposal systems; elements of environmental sanitation. Laboratory included. Field trips to be arranged. Corequisite: Engineering 145 or consent of instructor for non-civil engineering students. One course. *Vesilind*

126. Sanitary Engineering Design. Design of facilities for providing an adequate supply of water of good quality, and means for collection, treatment, and disposal of municipal and industrial wastewaters. Location and design of treatment works. Field trips to be arranged. Prerequisite: CE 124. One course. *Vesilind*

127. Environmental Pollution. A study of the environment—causes and effects of air, land, and water pollution. Interactions between the environment and stresses to which it is subjected as a consequence of growth and concentration of populations and their increasing demands on natural resources. For non-civil engineering juniors and seniors. One course. *Vesilind*

131. Structural Analysis I. An introduction to the process of applying the engineering method in the creation of structures. A unified treatment of statically determinate and indeterminate structural systems. Prerequisite: Math 73, and CE 73 or Engineering 75. One course. *Brown and Utku*

133. Structural Design I. Non-homogeneous materials. Determination of physical and mechanical properties of construction materials. Theory and design of compression and flexural members. Emphasis on ultimate strength theory for concrete. Timber design using mechanical fasteners, selected design problems in concrete to include forms and timber supports. Prerequisite: CE 131. One course. *Palmer*

134. Structural Design II. Design in metals, primarily steel. Properties of materials as criteria for failure. Tension, compression, and flexural members. Riveted, bolted, and welded connections, including eccentric connections. Built-up members. Design by elastic and plastic methods. Selected problems to include computations and drawings. Prerequisite: CE 131. One course. *Palmer*

139. Introduction to Soil Mechanics. Origin and composition of soils; soil structure. Flow of water through soils; capillary and osmotic phenomena. Soil behavior under stress; compressibility, shear strength. Elements of mechanics of soil masses with application to problems of bearing capacity of foundations, earth pressure on retaining walls, and stability of slopes. Laboratory included. Prerequisites: Engineering 83 and 145. One course. *Clough and Vesic*

140. Structural Analysis II. An elective course for students who have a special interest in structures. Fundamental and special methods applied. Introduction to limit design and to matrix and computer methods. Prerequisites: CE 131 and Math 74. One course. *Brown and Utku*

143, 144. Projects in Civil Engineering. These courses can be taken as electives by certain seniors who have shown aptitude and interest in research. Permission for enrollment should be secured from the Director of Undergraduate

Studies, with the approval of the student adviser and the professor under whom the project will be undertaken. Half-course to two courses.

146. Professional Engineering. Topics related to the practice of civil engineering: engineering economy, contracts, specifications, and ethics. Presentation of student papers on historical and current aspects of civil engineering. Prerequisite: senior standing. Half-course. *Palmer*

201. Advanced Mechanics of Solids. Cartesian tensors. Analysis of states of stress and strain, field equations. Constitutive relations for elastic, viscoelastic, and elastic-plastic solids. Energy principles. Virtual work techniques, limit analysis. The correspondence principle. Application to bars, beams, shafts, beams on elastic foundations, and pressure vessels. Simple torsion and plane problems. Co-requisite: Mathematics 285 or equivalent. One course. *Dvorak*

202. Experimental Mechanics. Experimental analysis of stress and strain; correlation of theory with experimental data; errors; photoelasticity; strain gages; brittle lacquers; similitude principles and design of models; dynamic measurements. One course. *Wilson*

203. Elastic Stability. Linear buckling problems of structures in continuum such as bars, rings, beams, curved beams, thin plates, and thin shells. Linear buckling of structures in discrete space, such as trusses, frames, and discrete representations of plates and shells. Differential equation formulations versus extremum formulations in linear buckling problems. Systematic treatment of buckling problems as linear eigenvalue problems in discrete space and in continuum. Numerical methods for eigenvalue extraction. One course. *Utku and Wilson*

204. Plates and Shells. Formulation of linear equilibrium problems of Kirchhoffian and non-Kirchhoffian thin plates of isotropic and orthotropic materials. Solutions in terms of previously tabulated functions. Finite difference methods. Extremum formulation of the plate problem. Finite difference and finite element methods as applied to the extremum formulation. Folded plates. Numerical solution methods for the folded plates. Membrane theory of thin shells. One course. *Utku*

205. Elasticity.* Introduction to linear theory of elasticity. Constitutive equations for anisotropic and isotropic elastic solids. Formulation and solution of torsion, bending, and plane problems by semi-inverse, complex potential, and variational methods. Three-dimensional problems. Prerequisite: Civil Engineering 201 or equivalent. One course. *Dvorak*

211. Mechanical Behavior of Materials. Mechanical behavior and its relationship to microstructural deformation and fracture processes in polycrystalline, polymeric, and composite materials. Influence of temperature, strain rate, and environmental conditions on material behavior. Fracture mechanics and its application to brittle and ductile fracture, and fatigue in structural metals, polymers, composites, and concrete. Prerequisite: Civil Engineering 201. One course. *Dvorak*

217. Urban Systems Analysis. Quantitative approaches to the analysis of public services, activities, and facilities. Model building. Demand forecasting, cost, performance, and impact models. Planning methodologies and system evalua-

*Offered alternate years (next offering 1973-1974).

tion techniques. Optimization of urban and regional systems. Emphasis on transportation, housing, land use, and public utilities and services. Prerequisites: Civil Engineering 117 and Engineering 168 or equivalent. One course. *Dajani*

221. Incompressible Fluid Flow. Steady and unsteady pipe flow, theories of turbulent flow; water hammer theory and control; surge tanks; air chambers; the analysis and control of fluid systems; effect of resistance; tapered conductors. One course. *Muga*

222. Open Channel Flow. Basic principles. Selected flow problems and practical solutions; gutter and inlet flows, flow over spillways, flow into estuaries and bays. Design of open channel structures, river hydraulics. Design of flood control and navigation structures; culverts, bridge openings, energy dissipators. One course. *Muga*

223. Flow Through Porous Media.* Theory of miscible and immiscible fluid displacement processes. Derivation and solution methods. Selected problems in stability, fingering, and capillarity. Applications; saline water intrusion, secondary recovery processes, seepage through earthen dams, dewatering of construction sites, well point operation. One course. *Muga*

224. Coastal and Tidal Hydraulics.* Basic analytical concepts; wave phenomena, theory of surface water wave motion, wave modification, internal waves, wave spectra, selected problems; harbor seiching, moorings, fenders, sand bypassing, breakwater and pier design. One course. *Muga*

225. Engineering Hydrology.* Study of processes governing the origin, distribution, and depletion and replenishment of water resources and application of this knowledge to the solution of water supply and drainage problems. Topics include the hydrologic cycle, hydrometeorology, precipitation, runoff, hydrograph analysis, evapotranspiration, infiltration, groundwater, runoff, stream flow, groundwater recharge, and hydrologic measurements. One course. *Vesilind*

230. Matrix Methods in Structural Analysis.* A study of the displacement method of structural analysis and the use of matrices in the analysis of rigid frames and trusses; application to multispans and multistory frames and space trusses. Computer solutions are emphasized. Prerequisite: CE 140. One course. *Brown*

231. Structural Engineering Analysis. A study in depth of a number of "classical" topics in structural analysis, such as elastic arch design; plasticity and limit design; numerical and approximate methods of beam deflection analysis. Computer solutions of structural problems. One course. *Brown*

232. Reinforced Concrete Design. A critical review of research related to the development of existing codes. Special attention is given to the consideration of temperature change effects, shrinkage, plastic flow, bond, shear and diagonal tension. Two-way slab and flat plate design. One course. *Brown*

233. Prestressed Concrete Design.* A critical review of research and recent developments in prestressed concrete design. Prestressed tanks, beams, and columns; partial prestressing and composite design. One course. *Brown*

234. Structural Design in Metals.* Design of metal structures using both

*Offered alternate years (next offering 1973-1974).

elastic and plastic theories. Application to plate girders, bridge trusses, and building frames. Interpretation and justification of building codes and specifications. Planning, preliminary design, and organization of design procedures. One course. *Palmer*

235. Foundation Engineering. An introduction to methods of analysis, design, and construction of foundations. Bearing capacity and settlement of shallow and deep foundations. Soil exploration; excavation and bracing; drainage and stabilization; underpinning. Foundation vibrations. One course. *Vesic*

236. Earth Structures.* An introduction to methods of analysis, design, and construction of earth structures such as dams, embankments, cuts, canals, airfield and highway pavements. Selection of materials, soil compaction, and stabilization. Theory of seepage, design of wells and drainage collectors. Slope stability and related problems. Theory of layered systems and pavement design procedures. One course. *Clough*

243, 244. Sanitary Engineering Unit Operations and Process Design. Fundamental bases for design of water and waste treatment systems, including transport, mixing, sedimentation and filtration, gas transfer, coagulation, and biotreatment processes. Two courses. *Vesilind*

247. Air Pollution Control. The problem of air pollution, with reference to chemical and biological effects. Measurement and meteorology of air pollution. Air pollution control methods. Noise pollution, odor, air pollution law. One course. *Vesilind*

248. Solid Waste Management. Collection, treatment, and disposal of solid wastes from wastewater treatment. Filtration and centrifugation theory and application. Pumping of solid-liquid mixtures. Sludge conditioning by chemicals and heat. Sludge combustion, pyrolysis, and drying. Treatment of solids from air pollution control devices. Application of systems analysis to collection of municipal refuse. Sanitary landfills and incineration of solid wastes. Reuse and recycling of solid wastes, including paper, plastics, aluminum, and petroleum products. Prerequisite: Civil Engineering 124 or consent of instructor. One course. *Vesilind*

250. Engineering Analysis. Formulation of mathematical models for a wide variety of problems selected from the fields of engineering, economics, and management science; system optimization; use of higher mathematics including infinite series, finite difference calculus, energy methods, and also digital computers as problem-solving techniques. One course. *Wilson*

Departmental Major in Civil Engineering

The major requirements are included in the minimum total of 32 courses listed under general requirements and departmental requirements. Specific courses which must be included are: Engineering 11 (half-course), 75, 83, 104, 123, 145; CE 16 (half-course), 116, 123, 124, 131, 133, 134, 139; and EE 63.

ELECTRICAL ENGINEERING

Professor Owen, *Chairman*; Assistant Professor George, *Director of Undergraduate Studies*; Professors Artley, Kerr, Meier, Pilkington, Thurstone, and Wilson; Visit-

*Offered alternate years (next offering 1973-1974).

ing Professor Trickey; Associate Professors Hacker, Joines, Marinos, Nolte, Wang, and Wells; Adjunct Associate Professor Olive

Electrical Engineering is a broadly-based discipline dealing with the processing, control, and transmission of information and energy by making use of the electrical and magnetic forces of nature. A partial listing of in-depth technical programs possible under the electrical engineering curriculum at Duke follows: communication systems, computer systems design, information science, electronics-networks, electromagnetics, physical electronics, control systems, energy conversion, applied mathematics, and applied physics. Students with other interests such as pre-medicine, prelaw, computer science, management, economics, art and music, psychology, and social systems may also be accommodated within the curriculum. These programs are individually designed and, in addition to stressing the acquisition of specific skills and methods seek, in both the classroom and laboratory, to stimulate students to think creatively in terms of fundamental concepts.

Opportunities for research and project work are available in the following research and teaching laboratories: Solid-state Materials Laboratory is concerned with the study at the molecular and microscopic levels of the macroscopic properties of materials as exploited in devices. In the Ferromagnetics Laboratory, there are investigations into such properties as magnetothermal, magneto-optical, and magnetoresistive effects. In the Superconducting Circuits and Thin-films Laboratory, investigations are directed toward some unique physical phenomena displayed by certain materials at near absolute zero temperatures. The Electronics Laboratory is used for the study of the physical behavior of basic electronic components and of advanced electronic devices and circuits. The Energy Conversion Laboratory is concerned with the generation, transformation, and control of energy in large-scale power systems and small self-contained systems. Automatic Control Systems Laboratory deals with the principles underlying instrumentation and automatic control. Spacecraft Systems Laboratory combines all phases of electrical engineering in solving problems encountered in modern spacecraft technology. In the Spacecraft Telemetry Systems Laboratory research centers on the recovery of information contained in noisy signals received from scientific satellites and space probes. In the Microwave Circuits Laboratory studies are being made of microwave circuits and systems. In the Cryomagnetic Materials Laboratory research is conducted in the area of magnetic susceptibilities of materials at very low temperatures. Digital Systems Laboratories are utilized for research and instruction in systems design. The Underwater Acoustic Communications Laboratory is concerned with the design and performance of optimum receivers for processing underwater acoustic signals.

42. Introduction to Digital Systems. A course designed for students who have no previous exposure to switching or Boolean algebra. Its main objective is to introduce the student to certain basic notions of switching algebra and to acquaint him with the application of these concepts to digital systems design. Elements of set theory, the laws of symbolic logic, formulation of logic expressions, simplification of switching functions are some of the theoretical topics to be discussed. The portion of the course dealing with applications covers both combinational and sequential digital networks, and provides an excellent opportunity for the actual hardware implementation of such networks utilizing available relay and electronic logic modules. Selected laboratory work is required. Fall and spring semesters. (Listed also as Computer Science 42.) One course. *Marinos*

63. Electric Networks. Complete analysis (transient and steady state) by transform methods of linear lumped parameter networks. Application of modern

analysis techniques to contemporary electrical engineering problems. Laboratory included. Prerequisite: Physics 52. Corequisite: Math 73. Fall and spring semesters. One course.

103. Introduction to Nonlinear Network Theory. Introduction to theory and techniques for analysis and synthesis of nonlinear circuits. Characterization of 2-, 3-, and n -terminal nonlinear network elements. Laws for interconnecting elements and determining equilibrium equations. Operating points, driving-point and transfer-characteristics plots. Graphical and numerical analysis and synthesis of dc and ac nonlinear resistive functional networks. Nonautonomous first-order nonlinear networks, and autonomous second-order nonlinear networks. Method of isoclines. Some laboratory and computer simulations. Prerequisite: EE 63. Fall semesters. One course. *Wilson*

113. Introductory System Theory. Modeling of physical systems and mathematical representations of dynamic systems. The concept of states, inputs, outputs, and systems. Classification of systems and types of input; Fourier series and transforms. Solutions of vector differential and difference equations. Properties of multivariable systems, equivalent representation and minimum realization of a transfer function matrix. Introduction to stochastic systems. Analog and digital computer simulation. Prerequisites: EE 63 and Math 73. Fall and spring semesters. One course.

143. Fields and Continua. This course introduces the physical concepts used in the description of fields and continua and relates these concepts to mathematical descriptions which permit a quantitative treatment of phenomena of interest to the engineer. Physical fields include: fluid flow, thermal (heat flow), radiation, electric, magnetic, electromagnetic, and stress-strain fields. Laboratory and computer applications will be used to assist in the learning of the material. Prerequisites: Math 74 and Physics 52. Spring semesters. One course.

155, 156. Special Topics in Electrical Engineering. Study of selected topics in electrical engineering tailored to fit the requirements of a small group. Prerequisites: approval of the Director of Undergraduate Studies and the instructor. Each half-course or one course. *Staff*

157. Introduction to Switching Theory. Techniques for the analysis and design of combinational and sequential switching networks. Boolean algebras; elements of code theory; minimum-complexity combinational networks; threshold logic; functional decomposition; minimum-complexity sequential networks; asynchronous sequential networks; clocked sequential systems; hazards in switching systems. Selected laboratory work. Normally open to juniors and seniors. Fall semesters. (Listed also as Computer Science 157.) One course. *Marinos*

161. Electronic Circuits. Graphical and mathematical modeling of electronic devices such as diodes, bipolar-junction and field-effect transistors, and vacuum tubes; techniques for the analysis and design of electronic circuits with emphasis on graphical, piece-wise linear, and small-signal methods; applications of these methods to particular circuits, including regulators, bias-point stability, amplifiers, and switching circuits; computer simulation of electronic circuits using ECAP. Three class sessions and one computation or laboratory session. Prerequisite: EE 63. Spring semesters. One course. *Wilson*

162. Electromechanical Energy Conversion. Principles of energy storage and conversion utilizing magnetic and electric fields; analytical treatment of dyna-

mic equations of motion, including the Euler-Lagrange approach; applications to the design of electromechanical transducers and rotating machines. Prerequisites: EE 113 and 143. One course. *Trickey*

163. Physical Electronics. Study of physical processes under the influence of electric, magnetic, thermal, and stress fields with contemporary electrical engineering applications: e.g., transistors, thermoelectric energy converters, and magnetic devices. Three class sessions and one computation or laboratory. Prerequisite: EE 164. One course. *George and Hacker*

164. Electromagnetic Fields and Waves. Electric and magnetic fields; Maxwell's equations developed from Coulomb's, Ampere's and Faraday's laws and the solenoidal nature of the magnetic field; electrostatics; magnetostatics; quasi-static and stationary fields; electromagnetic waves; retarded potential; relaxation time, reflection, polarization, and radiation of electromagnetic waves; transmission lines; probability waves in periodic structures. Three class sessions and one computation or laboratory. Prerequisite: EE 143. One course. *Joines and Kerr*

167. Design Colloquium. A course planned to guide the student in learning how the fundamental principles studied in the academic program are translated into the realities of engineering practice. The vehicle will be an extensive and intensive study of a significant modern engineering project. Extensive reference to published information and possible site visits to the projects will be part of the mode of operation, as will written and oral reports. One course. *Meier*

173, 174. Projects in Electrical Engineering. A course which may be undertaken only by seniors who are enrolled in the Graduation with Distinction program, or who show special aptitude for individual project work. Consent of the Director of Undergraduate Studies required. Elective for electrical majors. Half-course to two courses. *Staff*

185. Pulse and Digital Electronics. Generation and shaping of waveforms encountered in information processing systems, such as radar, computer, control and instrumentation. Typical circuit functions included are linear and nonlinear wave shaping, pulse and time-base generation, time delay, counting and gating. Emphasis on the application of semiconductor devices to the realization of circuit functions. Three class sessions and one computation or laboratory session. One course. *George*

186. Modulation Systems and Noise. Analysis and design of modulation systems. Description of deterministic and probabilistic signals; power spectra; sampling theory; amplitude-, frequency-, and pulse-modulation systems; pulse-modulation techniques. Sources and characteristics of noise; comparison of various modulation systems. Selected laboratory work. Prerequisite: EE 161. One course. *Nolte and Wang*

187. Electronic Processes in Materials. Prediction and explanation of the response of ferroelectric, magnetic, superconductor, and semi-conductor materials to thermal, electric, magnetic, and stress fields. Exploration of possibilities of improving the materials. Three class sessions and one computation or laboratory. Prerequisite: EE 163. One course. *Hacker*

188. Dynamics of Electromechanical Energy Conversion. An analytical and experimental study of the dynamic characteristics of electromechanical energy

conversion devices that are utilized in both control and power applications. Three class sessions and one three-hour laboratory. Prerequisite: EE 162. One course.

196. Microwaves and Quantum Electronics. A study of the special field and circuit techniques required at microwave frequencies; electromagnetic wave propagation in unbounded and bounded media; transmission and reflection properties of various microwave networks. Equivalent circuits and matrix methods will facilitate analysis. Discussion of microwave amplifiers and oscillators, including klystrons, magnetrons, traveling-wave tubes and masers. Selected laboratory experiments. Three class sessions and one computation or laboratory. Prerequisite: EE 164. One course. *Joines*

199. Linear Feedback Systems. Analysis and design of linear, continuous-data feedback control systems; stability tests; time and frequency domain methods; performance specifications; study of electrical, mechanical, hydraulic, aerodynamic, pneumatic, and thermal systems. Three class sessions and one three-hour laboratory. Prerequisite: permission of instructor. One course. *Wells*

203. Random Signals and Noise. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory; joint, conditional, and marginal distributions; random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting filters. Introduction to optimum signal detection and parameter estimation. Fall semesters. (Listed also as Computer Science 203.) One course. *Kerr and Nolte*

204. Information Theory and Communication Systems. Information and entropy and their application in communication situations. Noise and channel capacity, coding, and the fundamental theorem of information theory. Continuous channels and transmission of band-limited signals. Comparisons of various practical modulation techniques from the standpoint of information rate and error probability. Spring semesters, 1972, 1974. Prerequisite EE 203. One course. *Kerr and Nolte*

205. Signal Detection and Extraction Theory. Introduction to signal detection and information extraction theory from a statistical decision theory viewpoint. Subject areas covered within the context of a digital environment are decision theory, detection and estimation of known and random signals in noise, estimation of parameters and adaptive recursive digital filtering, decision processes with finite memory. Applications to problems in communication theory. Spring semesters. (Listed also as Computer Science 205.) Prerequisite: EE 203 or permission of instructor. One course. *Nolte*

208. Digital Computer Design. Fundamentals of digital arithmetic; hardware implementation of combinational and sequential logic circuits; adders, multipliers, switching matrices, shift registers, counters, comparators, and character generators. Detail design of a simple digital computer system. Selected laboratory work. Spring semesters, 1973, 1975. (Listed also as Computer Science 208.) Prerequisite: EE 157 or permission of instructor. One course. *Marinos and Owen*

211. Solid State Theory. The fundamental theory of wave motion in solids. Wave mechanics; variational method; perturbation theory; many-electron problems; one-electron approximation; free-electron approximation; electron spin; Brillouin zones; time-dependent Schrodinger's equation; and transition probabilities. Introduction to thermostatics and statistical mechanics. Fall semesters. Prerequisite: permission of instructor. One course. *Artley and Hacker*

212. Solid State Materials. Concepts of solid state physics as applied to engineering materials; electric, magnetic, thermal, and mechanical properties of solids; dielectrics; semiconductors; magnetic materials; and superconductors. Selected laboratory work. Spring semesters, 1972, 1974. Prerequisite: EE 211. One course. *Artley and Hacker*

213. Principles of Magnetism. Classical field theory and quantum mechanical descriptions of magnetic properties of materials. Diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, and ferrimagnetism. Resonance and relaxation in magnetic materials. Anisotropy, magnetostriction, domain theory and switching properties. Selected topics to relate theory of magnetism to applications of engineering interest. Spring semesters, 1973, 1975. Prerequisite: EE 211 or permission of instructor. One course. *Artley and Hacker*

215. Semiconductor Physics. A quantitative treatment of the physical processes that underlie semiconductor device operation. Topics include: band theory and conduction phenomena; equilibrium and nonequilibrium charge carrier densities; charge generation, injection, and recombination; drift and diffusion processes; low and high field conduction. Prerequisite: EE 211 or permission of instructor. One course. *Staff*

217. Masers. Principles of masers, particularly optical masers. Discussion of quantum electronics, optical configuration; solid state, gaseous, and liquid devices; modulation; high power operation. Two class sessions and laboratory. Spring semesters, 1973, 1975. Prerequisite: permission of instructor. One course. *George*

222. Nonlinear Analysis. Introduction to methods of analyzing engineering systems described by nonlinear differential equations: analytic, numerical, graphical, and series approximation methods; analysis of singular points; stability of nonlinear systems. Applications of various methods, such as the modified Euler, Runge-Kutta, isoclines, perturbation, reversion, variation of parameters, residuals, harmonic balance, Bendixon, and Liapounov to phenomena of nonlinear resonance, subharmonics, relaxation oscillations, and forced oscillating systems. Fall semesters. (Listed also as Mechanical Engineering 232.) One course. *Wilson*

225. Semiconductor Electronic Circuits. Analysis and design of electronic circuits utilizing a variety of static and dynamic models of semiconductor devices. Transistor and other semiconductor device circuit models; bias stability; high frequency and noise models; switching characteristics; illustrative semiconductor circuits. Selected laboratory work. Spring semesters. Prerequisite: permission of instructor. One course. *George*

227. Network Synthesis. Linear network theory, including a review of time and frequency domain analysis; network graphs; network functions and realizability condition; driving point impedance synthesis of passive networks; driving point and transfer specifications; approximation methods. Fall semesters, 1972, 1974. Prerequisite: permission of instructor. One course. *George*

242. Modern Control and Dynamic Systems. The statespace point of view is used as a vehicle to integrate the classical control and modern systems techniques. Topics include vector differential equations, modal matrix transformation, modified canonical forms, and controllability and observability concepts. Also system stability and mathematical modeling methods for lumped- and distributed-parameter systems. Modal control of multivariable control systems. (Listed also as Mechanical Engineering 230.) One course. *Wright*

243. Advanced Linear Systems Theory. Definition of a linear, dynamical system; mathematical preliminaries including set theory, linear algebra, vector differential and difference equations; concepts of state space and state variables; state-model description, multivariate systems; the basic existence and uniqueness theorem, stability, transfer function, transition matrix and zero-state, zero-input responses of the system; concepts of reachability, controllability, observability and their practical implications. Transformation and equivalence of linear systems. Fall semesters. Prerequisite: permission of instructor. One course. *Wang*

259. Advanced Electric Energy Conversion. Equations of motion of electromechanical systems; fields and lumped parameters, state function concepts; mathematical techniques for analyzing electromechanical devices and systems; transducers; unified treatment employing matrix, tensor, and block-diagram concepts to obtain response under static and dynamic conditions; the generalized rotating machine. Prerequisite: permission of instructor. One course.

265. Advanced Topics in Electrical Engineering. Opportunity for study of advanced subjects related to programs within the electrical engineering department tailored to fit the requirements of a small group. Prerequisite: approval of the Director of Undergraduate Studies and of instructor under whom work will be done. One course. *Staff*

271. Electromagnetic Theory. The classical theory of Maxwell's equations; electrostatics, magnetostatics, boundary value problems including numerical solutions, currents and their interactions, force and energy relations. Three class sessions. Fall semesters. Prerequisite: permission of instructor. One course. *Joines*

272. Application of Electromagnetic Theory. Propagation of electromagnetic waves in various structures and media; mathematical description of microwave networks, including equivalent circuits and matrix methods; microwave circuit theorems and synthesis techniques. Selected laboratory experiments. Spring semesters 1972, 1974. Prerequisite: EE 271. One course. *Joines*

Departmental Major in Electrical Engineering

The major requirements are included in the minimum total of 32 courses listed under general requirements and departmental requirements. The specific courses EE 63, 113, and 143 must be included.

MECHANICAL ENGINEERING

Professor Chaddock, *Chairman*; Professor Kenyon, *Director of Undergraduate Studies*; Professors Harman, Linderoth, Macduff, Meriam, and Pearsall; Associate Professors Clark, Elsevier, and Shepard; Adjunct Associate Professor Murray; Assistant Professors Buzzard, Munson, Nash, and Wright; Instructors Cudlin and Gerstle

The Mechanical Engineering Department is organized in three areas: design and control of machines and processes, materials science and development, and thermal and fluid systems. These areas are the special fields of competence of the faculty, and are representative of the educational and research activities of the department. They are inadequate, however, to inform the prospective student of the broad program opportunities which can be developed within the mechanical engineering curriculum. These include: automatic control, biomechanics, business management, combustion engineering, environmental quality and control, heat and

mass transfer, materials processing, mechanical design, ocean engineering, power and propulsion, transportation technology, and vibrations and noise control.

Undergraduate laboratories provide unique learning experiences and assist in the development of professional attitudes and approaches to typical engineering problems. The System Dynamics Laboratory introduces fundamentals of instrumentation and dynamic system responses through simulation techniques. The Materials Laboratory has equipment for the preparation, testing, and microscopic examination of metals, polymers, ceramics, as well as naturally occurring materials. The Thermal and Fluid Systems Laboratory involves the student in the analysis of thermal and fluid systems and introduces experimental techniques for the measurement of physical and thermodynamic properties. The System Response and Control Laboratory emphasizes computer simulation of feedback systems and familiarization with associated hydraulic and pneumatic automatic control components. Oral and written reports are an integral part of the Senior Projects Laboratory in which a student identifies a need for experimentation, designs his "model," and instruments it to provide the desired data on an advanced project.

31. Engineering Applications of Digital Computation. An introduction to digital computation, including preparation of mathematical models from physical parameters. Programming the model for the digital computer. Applications are drawn from the basic areas of mechanical engineering and include propulsion, power, machines, and transport. One course. *Buzzard*

101. Thermodynamics. An introduction to both classical and statistical thermodynamics. The laws of classical thermodynamics are presented and applied to open and closed systems. Continuum properties, processes, and cycles are included. Molecular distribution and property evaluation, especially entropy, are considered from the statistical and quantum viewpoints. Prerequisites: Physics 51 and Math 73. One course. *Harman, Elsevier, and Kenyon*

102. Thermodynamics II. Continuation of the study of the basic laws and processes of thermodynamics with emphasis on energy conversion and property evaluation. Included are combustion and chemical equilibrium, gas mixtures and psychrometrics, and power cycles. One course. *Elsevier*

111. Physical Metallurgy. Extension of the principles of Engineering 83 to the metallic state; atomic, experimental, and thermodynamic approaches to metallurgy; phase transformations and hardening mechanisms, relationships between the structure of alloys and plastic behavior with emphasis on engineering alloy systems. Prerequisite: Engineering 83. One course. *Shepard and Pearsall*

112. Polymer Science. Extension of the principles of Engineering 83 to high molecular weight polymers, especially those which have significant engineering applications; structure and properties of polymers; polymerization mechanisms; properties of commercial polymers; polymer processing. Prerequisite: Engineering 83. One course. *Clark and Pearsall*

123. Dynamics. General principles of dynamics as applied to particles, rigid bodies, and selected nonrigid systems with emphasis on the formulation of engineering problems. Absolute and relative motion analysis. Work-energy and impulse-momentum methods. Introduction to kinematics and kinetics in three dimensions and to Lagrange's equations using generalized coordinates. Prerequisites: Physics 51, Math 73, Engineering 75, or CE 12. One course. *Meriam, Macduff, and Wright*

126. Fluid Mechanics. An introductory course emphasizing the application of the principles of conservation of mass, momentum, and energy to a fluid system. Physical properties of fluids; dimensional analysis and similitude, viscous effects and integral boundary layer theory; subsonic and supersonic flows; normal shock waves. Selected laboratory work. Corequisites: ME 123 and 101. One course. *Buzzard and Munson*

128. Dynamics of Gases. The flow of compressible fluids at high velocities. One-dimensional compressible flow: area change; normal shock, friction and heat transfer; Mach number. Prerequisite: ME 102. One course. *Buzzard*

135. Vibration Control. An introduction to the dynamics of mechanical systems; equilibrium, stability, lumped and distributed systems. System analysis by classical differential equations, mechanical impedance, and computer methods. Prerequisites: Math 73 and Engineering 72. One course. *Macduff*

136. Response of Systems. System design for optimum dynamic response. Development of mathematical models from physical systems, operational and computer techniques, matrix methods for lumped and distributed systems, instrumentation and testing of components and systems, effect of nonlinearities. Prerequisites: Math 74, ME 123, and Engineering 72. One course. *Macduff and Wright*

141. Mechanical Design I. A study of the broad aspects of mechanical design starting with the creative process and considering the effects of economics, human factors, ethics and prior art on design. Basic mechanical components such as gears, cams, bearings, springs, shafts, etc. will be introduced in the discussions so that the student will become familiar with their design and application. A term design project will serve to practice the application of the design process. Prerequisite: ME 123. One course. *Linderoth*

142. Kinematics and Dynamics of Machinery. Study of the geometry of mechanisms. An introduction to the mathematics of gears, cams, linkages and intermittent motion devices. The kinematics and kinetics of linkages. Computer solutions for linkage problems. Prerequisites: Math 73. Corequisite: Engineering 123. One course. *Linderoth*

143. The Design of Machine Elements. The detail design of machine elements. Study of the problems of stress and strain (deflections) as they affect and modify design requirements. Reliability and safety as design parameters. Prerequisite: ME 141. One course. *Linderoth*

150. Heat and Mass Transfer. Study of the mechanisms of heat transfer processes. Steady and transient conduction in solids, numerical and graphical methods; heat exchanger design, performance; thermal radiation; convective processes, turbulent and laminar flow, steady and transient diffusion, mass transfer between phases. Prerequisites: ME 126 and Math 74. One course. *Chaddock and Cudlin*

153. Heating, Air Conditioning, and Refrigeration. Principles of thermodynamics, heat transfer, and fluid flow applied to comfort and industrial air conditioning. Cycles and equipment for heating, cooling, and humidity control. Air transmission and distribution. Modern vapor compression, absorption, and low temperature refrigeration cycles and systems. Prerequisite: ME 101. One course. *Elsevier*

156. Combustion Engines. A study of cycles, fuels, and fuel mixtures in piston, ram jet, and rocket engines. Comparison of real and theoretical cycles; carburetion and fuel injection systems; modern developments. Prerequisite: ME 101. One course. *Elsevier*

165, 166. Special Topics in Mechanical Engineering. Study arranged on a special engineering topic in which the faculty has particular interest and competence as a result of research and professional activities. Prerequisite: permission of the instructor and Director of Undergraduate Studies. Each half-course or one course. *Staff*

172. Kinematics of Mechanisms. Analysis of velocities and accelerations in a moving rigid link; techniques for determining velocities and accelerations in mechanisms; introduction to kinematic and geometric synthesis. Prerequisite: ME 123. One course. *Nash*

173. Ocean Engineering. An introductory course to acquaint the student with the basics of physical and chemical oceanography and the need for and application of engineering knowledge and methods to the design and operation of structures, vehicles, and communications systems for use on and in the oceans. Prerequisite: junior standing in any department. One course. *Linderoth and Muga*

177. Computer Techniques for Simulation and Design. Modern analog and digital computation used in the design of advanced engineering systems. Problems described by linear and nonlinear differential and algebraic equations will be solved. Linkage-cam mechanisms, heat exchangers, rocket nozzles, missile roll control, and aircraft stability are typical problem topics. One course. *Wright*

182. Fundamentals of Nuclear Engineering. Review of nuclear physics, nuclear interactions and cross sections, neutron induced chain reactions, shielding, hazards, isotope utilizations, reactor systems, and power reactors. Prerequisite: permission of instructor. One course. *Kenyon*

183. Power Plants. Basic concepts of thermodynamics, heat transfer, and fluid flow are combined with industrial data for the consideration of real power plant problems. Selection of steam generators, prime movers, fans, pumps, heaters, and piping systems with regard to engineering and economic points of view. One course. *Kenyon*

197, 198. Projects in Mechanical Engineering. This course may be assigned by the chairman of the department to outstanding seniors who express a desire for such work and who have shown aptitude for research in one distinct field of mechanical engineering. Prerequisites: *B* average and senior standing. Half-course to two courses. *Staff*

202. Theoretical Thermodynamics. Classical thermodynamics and thermodynamics continuum properties for real substances, equilibrium, introduction to statistical thermodynamics. One course. *Elsevier and Harman*

203. Introduction to Advanced Mechanics. A comprehensive introduction to advanced theory and application in advanced mechanics with emphasis on stability, space kinematics, and kinetics of particles and rigid bodies, generalized motion equations for constant and time-dependent mass systems, and generalized coordinates. One course. *Meriam*

211. Theoretical and Applied Polymer Science. An advanced course in materials science and engineering, dealing specifically with the structure and properties of polymers. Particular attention is paid to recent developments in the processing and use of modern plastics and fibers. Product design is considered in terms of polymer structures, processing techniques, and properties. One course. *Pearsall*

214. Environmental Factors in Materials Science. Effects of environments on the design and utilization of modern engineering alloys. Theory and mechanisms of corrosion, particularly in seawater and atmospheric environments. Microstructural aspects of diffusion, oxidation, hot corrosion, and stress corrosion. Prerequisite: Engineering 83. One course. *Shepard*

221. Compressible Fluid Flow. The concepts and analysis for flow of gases in subsonic to hypersonic regime. Two-dimensional flow; oblique shocks; experimental techniques. One course. *Harman, Munson, and Buzzard*

222. Heat Transfer. Steady-state and transient solutions of the general heat conduction equation. Development of the equations for transport of energy by fluid motion. Principle of similarity and dimensional analysis in convective energy transport. Solutions of the boundary layer equations. The laws of radiation heat transfer and radiation heat exchange. One course. *Chaddock and Buzzard*

226. Intermediate Fluid Mechanics. A survey of the principal concepts and equations of fluid mechanics. Fluid properties. Statics. Basic equations for the control volume. The differential equations of fluid motion. Stream function. Irrotational flow. Navier-Stokes equations. Kelvin's and Crocco's theorem. Applications to two-dimensional incompressible potential flow and to viscous flow in boundary layers. One course. *Buzzard and Munson*

230. Modern Control and Dynamic Systems. The statespace point of view is used as a vehicle to integrate the classical control and modern systems techniques. Topics include vector differential equations, modal matrix transformation, modified canonical forms, and controllability and observability concepts. Also system stability and mathematical modeling methods for lumped- and distributed-parameter systems. Modal control of multivariable control systems. One course. *Wright*

231. Systems Response and Control. Methods, applicable to design, of obtaining parameters for strength, response, and stability studies of mechanical systems. Analysis of closed loop control systems with linear transfer functions; electrical and mechanical analogs; introduction to determination of transfer function from input-output characteristics. One course. *Macduff and Wright*

232. Nonlinear Analysis. Introduction to methods of analyzing engineering systems described by nonlinear differential equations: analytic, numerical, graphical, and series approximation methods; analysis of singular points; stability of nonlinear systems. Applications of various methods, such as the modified Euler, Runge-Kutta, isoclines, perturbation, reversion, variation of parameters, residuals, harmonic balance, Bendixon, and Liapounov to phenomena of nonlinear resonance, subharmonics, relaxation oscillations, and forced oscillating systems. Fall semesters. Prerequisite: permission of instructor. (Listed also as Electrical Engineering 222.) One course. *Wilson*

233. Fluid Control Systems. A design oriented course concerned with hydraulic and pneumatic feedback control systems. Basic control system characteris-

tics; linearized transfer functions; determination of transfer function from computation and experiment; position, velocity, and acceleration feedback devices; transducers; DC and AC hydraulic and pneumatic amplifiers. One course. *Macduff and Munson*

235. Advanced Mechanical Vibrations. Analytical and experimental procedures applied to design of machines and systems for adequate vibration control. Determination of eigenvalues and eigenvectors by iteration and computer techniques; transfer matrices applied to lumped and distributed systems; analytical and numerical methods of obtaining the pulse response of plane and three dimensional multi-mass systems; convolution and data processing; introduction to random vibration. One course. *Macduff*

236. Engineering Acoustics and Noise Control. Specification of the physical properties of noise, noise measurement, and absorption, transmission, and propagation of sound. Effects of noise on man, noise exposure, and damage risk criteria. Legal aspects of noise control, source modification, enclosures, barriers, and personal protectors. Prerequisites: ME 123 and Math 111. One course. *Macduff*

251. Refrigeration and Cryogenics. Theory and experiment in the evaluation of the thermodynamic properties of refrigerants and cryogenic fluids. Thermodynamics of vapor compression, air cycle, absorption, and thermoelectric refrigeration. Production of low and very low temperatures, helium liquifiers. Two-phase, flow processes. Heat exchange for refrigeration and cryogenic transfer. One course. *Chaddock*

255. Energy Conversion. Principles, thermodynamics, and classification of energy conversion devices. Introduction to semi-conductors, thermoelectric generators, photovoltaic generators, thermionic generators, magnetohydrodynamic generators, fuel cells, and other energy conversion devices. One course. *Harman*

265. Advanced Topics in Mechanical Engineering. Opportunity for study of advanced subjects related to programs within mechanical engineering tailored to fit the requirements of a small group. Prerequisites: Approval of the Director of Undergraduate Studies and the instructor under whom work will be done. One course. *Staff*

270. Theory of Lubrication and Bearing Design. A study and analysis of the theory of hydrodynamic and hydrostatic lubrication will be presented. The dynamics of bearing loading, bearing design and materials will be examined in their relationships to the theory of lubrication. Properties of lubricants will be reviewed. The student will have ample opportunity to put theory into practice with real bearing problems taken from industrial machinery, construction equipment, transportation media and wherever relative motion is required between adjacent surfaces. One course. *Linderoth*

280. Nuclear Reactor Power Cycles. Basic reactor principles and types. Examination of most feasible thermodynamic cycles for use with both stationary and mobile power plants. Consideration of safety shielding, heat transfer, fluid flow, and materials problems unique to reactor design. One course. *Kenyon*

Departmental Major in Mechanical Engineering

The major requirements are included in the minimum total of 32 courses listed under general requirements and departmental requirements. Specific courses which must be included are: Egr 72, 75, 83; ME 101, 123, 126, 136, 141, and 150.

Appendix

DEGREES AWARDED JUNE 7, 1971

Bachelor of Arts

Jean Elizabeth
James Beach Allen
Thomas B. Allen
Michael Patrick Allred
Charlotte Anne Alspach
Gary N. Altman
Christine Holmes Anderson
Vereen Louise Andrews
Peter Charles Applebome
Carolyn Mary Arnold
Philip Paul Asack
Margaret Ellen Ashworth
Ellen Louise Atterdige
Emily Harward Austin
Clara H. Axam
John Edward Ayoub
David Pierson Badger
Richard Olson Baer
Elizabeth Renwick Baker
Marcia Ann Ball
David Rudolph Ballantyne
Nancy J. Balles
Jeffrey N. Barlow
Marc Bruce Baron
Winifred Clare Barritt
Carol Amelia Barrow
Pamela Bomberger Barry
Paul Douglas Barry
Diane L. Barthel
Robert Michael Basha
Sherry Ellen Baskin
Nader Baydoun
Susanne Doggett Beaman
Mary Elizabeth Beath
Alan William Beattie
James Dunbar Beckwith, Jr.
Paul Robert Berger
John Dominic Bernethich, Jr.
Kathleen Elizabeth Berns
Edward S. Beron
Linda Ruth Berry
Richard Lee Biddle
Nancy Jo Biersach
Michael Harlan Bigsby
Delton Scott Bitter
Elizabeth Babson Bittle
Lois Jeannine Blackwell
William C. Blackwell, Jr.
William Henry Blackwell, Jr.
Linda Hayes Blair
Gary David Blake
Paul Anthony Blake
Robert James Blake
Jeanne Cockrell Blocher
Elizabeth Brandon Blythe
Charles Franklin Bond, II
Ernest Lincoln Bonner, Jr.
David A. Boone
Frank Born
Linda Webb Bost
John Mathews Bowers
Lewis H. Bowman
William Jackson Bowman, Jr.
Suzanne Latta Branch
James Rutland Brand
Dean George Breitingner
Douglas Stringer Brierley
Helen Harriman Briggs
Jonathan Deaderick Britt
Ann Hartwell Britton
Barbara Jane Britzke
Charles K. Broadhurst, Jr.
Marcia Lee Brooks
Carolyn F. Brosius
Bonnie Nancy Brown
Leonard Lee Brown, Jr.
Ralph Lawrence Brown, III
Sarah Margaret Brown

Thurletta Maureen Brown
Tom Walker Brown
William C. Brown
Martin Laird Bryant
Eugene Holcombe Buckle
William Warman Bulleit
Mitchell Munger Bunting
Paula Helen Burdon
Frederick Russell Burnett, Jr.
Margie Ann Burrell
David A. Campbell
Stephen Raymond Cannon
John Mario Cappellano
Richard Samuel Carro
Marsha Ruth Carroll
Jean Marie Cary
Harry Xavier Cashin, III
Ward Mitchell Cates
Lucy Highsmith Caudill
Teresa Catherine Ceravolo
Terrance Alan Chambers
Robert Lee Chapman, III
Thomas Alston Chapman
Bonita Diane Chepko
Wesley Merritt Chesson, III
Kathryn McLean Christie
Phillip Dennis Citron
Josie Knowlin Claiborne
Peter Hardin Clark
Priscilla Amelia Clark
Robert Gregory Clark
Richard S. Clarkson, Jr.
William Chambers Cline
Nancy Lee Coble
Jeffrey Tristram Coffin
William Arthur Coggins
Linda Watkins Collins
Anne Perry Constant
Melanie Sue Cooke
Alan Wynn Cooper
Charlie Thomas Council, Jr.
John Randolph Coupland, IV
John Stewart Cowdery, Jr.
Thomas Franklin Craggs, III
Jean Hannah Craven
Carolyn Maxine Crawley
Patricia Lynn Crawley
Florence Elizabeth Crenshaw
Miles Millar Croom
Edward F. Crowley, Jr.
Roxanna Elizabeth Cuddy
William Steven Culp
Carol Jane Dabbs
Mitchell Watkins Dale
Jeanne Coleman Dangerfield
Paul Clifford Darden, III
Deborah Lynn Darmstaetter
James Madison Dauphin
Cramer Thomson Davis
Terry Ann Davis
Christopher Malcolm Dawson
Douglas Perry Dean
James Stewart Dean
Mary Lindsay Dearborn
Frederick William Dennerline, III
Randall Drew Denton
Dick DeVenzio
Joan Dickinson
James Robert Dillman
Luther Samuel Dockery, III
Jon Warner Dodrill
Lewis R. Donelson
Richard Kevin Donovan
Stephen M. Dorman
Steven Robert Dottheim
Michael Edward Dougherty
Christine Doyle
Richard Marion Draffin

Pearson Emmanuel Dubar, Jr.
Ethel Duggan
David Harry Dunaway
Stephen Jon Dunham
Robert Clarke Dunn
Laurie Jeanne Earnheart
William Jordan Edwards, III
Grace Elizabeth Efird
Barbara L. Ego
Elizabeth Weisz Ehinger
Joseph John Eiden, Jr.
Laurie Judith Eisenberg
Wade Hampton Eldridge, Jr.
David Hunley Elebash
Charles Morton Elliott
Leigh Ellen Emerson
Robert M. Entman
John Auguste Erwin
Patricia Raney Evans
Samuel B. Evans
Sarah Hope Evans
Jane Marilee Wood Faller
William Dempsey Farmer, III
Stanley McCutcheon Farr
Zou Anne Feagin
Clifford Owen Feingold
Elizabeth Grey Ferris
Sally Ann Fetter
Thomas Fleming Fine
Mark Scott Fischer
Carolyn Bess Fisher
Steven Brooke Fisher
Thomas Edmunds Fitz, Jr.
Sundar Wilson Fleming
Richard Nick Fogoros
Patricia Clayton Fowler
Russell M. Frank
Benjamin Wesley Franklin
James Alan Fraser
James Baird Frazier
Marcia Ann Frederick
Daniel Klapp Freymeyer, II
Joan Mansfield Friedberg
William Ernest Frisco
Barbara Ann Funger
Christopher Steven Gaal
Richard Weisner Gabriel
William David Gaither
Jennet O'Brien Galbraith
Simmons S. Gardner
Carl David Geier
John Grady Geist
Lynne Gellenbeck
Arthur Lewis Gelston
Geoffrey Mack Georgi
Margaret Harriet Geraci
George Germaine
Mary Sharon Gibson
Gordon Davies Giffin
George Roberts Gilbert
Michael Gilligan
Geraldine Gilmore
Ashley Ann Gilster
Stefani Glasgow
Adrenee Gwennell Glover
Lon Grove Glover
Margaret Elizabeth Gobbel
Valerie Blish Goodwin
William H. Gordh
Susan Ellen Gore
Louise Ann Gorfain
Randall Fernand Grass
Michael A. Graves
Kimberly Kathryn Greene
Daniel Arthur Gregorie
George William Griffith
Diane Lynne Griffith
Leslie Claire Gropp

Mary Louise Gruber
 Guy Francis Guinn
 Gary Wayne Gulden
 Durward Franklin Gunnells, III
 Carl Shumate Gunter
 Arthur Allen Guthrie
 Robert Gay Guthrie
 Mansel Bruce Gwinn
 Bruce Gwinn
 Bruce Haertlein
 Terry Michael Hagans
 Marion Louise Hagberg
 Robert Hugh Hager
 Christopher Thomas Hailey
 Dawn Hope Hall
 Robert Clark Hall
 Ruth Ann Hall
 Diane Grace Halle
 Erich Jamison Hance
 Linda Christine Hand
 Helen Jamieson Hanes
 Elizabeth Chauvenet Hanifin
 Linda Marie Hankins
 Philip Rollins Hanlon
 Robert Michael Harbrecht
 Susan Diane Harbuck
 Margaret Ann Hardy
 Bonnie Lynn Harkey
 Martin Luther Harkey, III
 Ellie Glennon Harris
 James Allen Harris, Jr.
 Kent T. Harris
 Linda Ellen Harris
 Marjorie Ann Harris
 Arthur Bruce Harrison
 Marcia Huth Harrison
 Marion Leo Hart, Jr.
 Paul J. Hartmann
 Frances Freeman Harwell
 Douglas A. Hastings
 Robert Gayle Haighton
 Jay Lancaster Havice
 David Sterling Hay
 Michael Scott Hay
 Michael Robert Hayes
 Robert Bartlett Hayes
 Paul P. Hearn, Jr.
 Barbara Sue Heath
 Joseph John Hebert
 Thomas Reed Hedges, III
 Pamela Stephanie Helms
 Robert Connor Henderson
 Robert Nelson Henry
 Stephen Reynaud Herbert
 Harriet Celeste Herndon
 Cheryl Temple Herr
 Andrea Herron
 Robin Morgan Hessey
 Katherine McCauley Hibler
 Christopher Oman Hill
 Susan Hills
 Walter Eric Hinshaw
 Michael Barger Hirsch
 Thornton Emil Hoelle
 Les Hoffman
 Charles Ralph Hogshead
 David Conant Holmes
 Michael Stuart Honegger
 John Crawford Hope, III
 Janice Ann Horner
 Julie Rose Horvath
 Leslie Marion Howard
 James Frederick Howser
 Kathryn Ann Hudson
 Gail Camp Huggett
 Richard Joseph Hughes
 Sara Holden Humphrey
 Barbara Ann Hupp
 Herbert H. Hurst, Jr.
 Gordon Ross Hutchison
 Walter William Impert
 Melinda Nield Irvine
 David Michael Ivey
 Lee Franklin Jackson
 Linda Lee Jacobs
 Roy Steven Jacobson
 Mark Everett Janke
 Rosemary Jann
 Joseph Griffith Jay
 Vicki Lynn Jenkins
 Charles Andree Johnson

Sylvia Marina Johnson
 William Elliott Johnston
 Alan Davis Johnstone
 Jinx Johnstone
 John Thomas Jones
 Elizabeth Anne Jury
 Allen Kahan
 aMargaret Torrans Kaluk
 Nick Steven Kaluk, Jr.
 William Christian Kamenjarin
 Richard Ross Katherman
 Elizabeth Anne Keck
 Walter Steven Keith
 Peter Bennett Kelly
 Arlon Keith Kemple
 Patricia Ann Kenworthy
 Lee Sandler Kern
 Stephen Sims Kern
 Michael Henry Kettering, Jr.
 John Devereux Kimball
 Peter Fownes King
 Rebecca Wade King
 Lois Kinney
 John Q. Kluttz, III
 John Mark Krenkel
 Christine Krieger
 Seth Richard Krieger
 Michael R. Kronenfeld
 James Andrew Kruidenier
 Petra Elisabeth Kruithof
 Peter Alan Kuhn
 Mark Jay Kunkel
 Marcia Jean Kyzer
 John Christopher Laird
 Michael Stewart Lancaster
 Thomas Wade Landry, Jr.
 Thomas Kelsey Lane
 Kenneth Edward Larsen
 John Charles Lawrence, Jr.
 James Douglas Lawson
 Catherine Deloise LeBlanc
 Michael J. LeBlanc
 Jeffrey Roberts Lee
 Lawrence Kenneth Lesnik
 Tom Stephen Levine
 Janet Susan Lewis
 Marie Ann Lewis
 Alise Jeanne Liberman
 Roger William Lidman
 David Robert Lind
 Roberta Lindau
 Christopher Hood Little
 Stephen F. Litz
 Brenda Campbell Loftus
 Linda Allen Burcher Long
 Mary Borland Long
 Thomas Smither Long
 David Bittle Loope
 Susan Hubel Losito
 Elsie Louise Love
 Guy Boyd Lucas
 Paul Stephen Lux
 James Alexis MacDonald
 James C. Macdonald
 Bruce William MacEwen
 Victor Henry MacIntosh
 James Brooks Madden
 Dolly Madison
 Talmadge Patrick Maggard
 Phillip Carl Magnuson
 Kathryn Marley Magruder
 James Fredrick Maher
 Henry Wayne Majestic
 George Edward Michael Mantell
 John Ogden Manter
 Peter Brown Marco
 Robert David Margolis
 Joseph Ward Marion
 Stephen Joel Markman
 Julia Beth Marquis
 Walter Ledden Marshall, Jr.
 David Charles Martin
 Elbert Garrett Martin
 Hunter Griffin Martin
 John Rutledge Martin
 Rose Lilliston Mason
 Catherine E. Massey
 Francine Marie Matas
 Robert Hardy Matheson, Jr.
 Janet Lynn Mattison

Michael Dennis May
 Gerald James McCarthy
 Brenda J. McCarty
 Bernie Louis McCaskill, Jr.
 Michael Wade McCormick
 William Fauset McCrady, III
 Karen Goeller McCullough
 Page Harris McCullough
 William Richard McCune, Jr.
 Russ Frank McDonald
 James Duggins McDonough
 Mary Sue McDuffie
 Barbara Ann McIntyre
 James Carol McIntyre
 Anne M. Z. McKinney
 Mark Sanford McNeil
 Horace Laurens McSwain, III
 Carol Ann McSwiney
 Robert Denton Meadows
 Mark Steven Medvin
 Barbara S. Meier
 Robert R. Meinig
 Steven Alan Meixel
 Ann Robbins Mente
 Michael Wells Meriwether
 Carolyn Downes Mewborn
 Theodore Alan Middleburg
 Carey Richmond Miller, III
 Eleanor Carroll Miller
 James Robert Miller
 Jay W. Miller
 Mark P. Miller
 Gaines Meredith Mimms
 Carol Issac Mitchell
 Anne Gammon Moffett
 Charles Harvey Montgomery
 Donovan Benson Moore, Jr.
 Linda Ferreri Moore
 Robin Arthur Moore
 W. Taylor Moore, Jr.
 Joanna Lamb Moorhead
 Judith Allen Moreland
 Tucker Grantham Morgan
 Ola Marie Morris
 Bradley H. Morton
 Beverly Ann Mosher
 Lawrence Henry Muhlbaier
 Duncan Edward Munn
 Sallyann Munro
 Theodore Rose Murdock, III
 Sharon Anne Murphy
 Mark R. Murray
 Robert O. Nathan
 Susan Hobbs Neal
 Henry Niles Nelson, III
 Florence Eleanor Netting
 Mark Dickens Neuhart
 George Phillips Nevin
 John Lyndon Newell
 Thomas Alexander Newton, Jr.
 Susan Hamilton Nicoll
 Nancy Beth Nieman
 Denise Nitterhouse
 James Henson Nix
 Jane Marie Nordin
 Kathryn Sue Nordstrom
 Sarah Alice Ogden
 John Chatham Olive
 Janet Eleanor Ondek
 Grantland Lowe O'Neal
 Susan J. Owens
 Barbara Ellen Padgett
 Clarie Lynn Painter
 Daniel Palubniak
 John Hinton Parker, Jr.
 Nancy Parsons
 William Joseph Payne
 Craig Alan Pearson
 Jan A. Pechenik
 Carol Anne Peden
 Cort Andrew Pedersen
 Bruce Hogue Penrod
 Julia Carolyn Perry
 Susan Catherine Perten
 Mark Charles Peterson
 Jeffrey Buchanan Petticrew
 William Charles Pfister
 Thomas Herbert Philbrick
 Edith Anne Phillips
 George Oliver Phillips

John Russell Phillips
 Jerrold B. Pinsker
 John William Pittenger
 Patty Jenkins Pittman
 Warren Lewis Pittman
 Susan Frances Pollard
 Stephen Patrick Poolos
 William Lee Popham
 William Allison Porter
 Georgia Stephanie Pournaras
 Barbara Key Powell
 Benjamin Barnes Powell
 Margaret Smedes Poyner
 Harlan Lary Priour
 William H. Pritchard, Jr.
 Mark Jeffrey Proveda
 Kathryn Ann Puckett
 William Marr Pugh, Jr.
 David Lynn Pumphrey
 Mary Rachel Queen
 Nick Joe Rahall, II
 Douglass Evans Rankin
 Patricia L. Ransley
 Alice Ann Ratliff
 William Burton Rawleigh, Jr.
 Douglas Martin Rawlings
 Michael Evan Ray
 Pamela Jean Rebusci
 John Thomas Reed
 Margaret Anne Reel
 William Stuart Reese
 Jane Mundis Reid
 Daniel Sargent Reinhardt
 Richard James Rendleman, Jr.
 Bruce Collins Reynolds
 Edward John Rhoads
 Mary Thaddeus Ridge
 Jonathan Ries
 William J. Ritger
 Laurence Jay Robbins
 Fred Victor Robertson
 Dan Robinson
 Michael Richard Rochelle
 Stanley Glenn Rockson
 Arabella Thomas Rogers
 Esme Evans Rose
 Robert Hemphill Ross
 Virginia Power Ross
 Barbara Carol Ruby
 David Robert Ruppe
 Lance Arthur Russell
 Pamela Anne Sacrison
 Helen Anne Sadd
 Thomas David Sales, Jr.
 Edward Bryan Samuel
 Michael J. Samuels
 Lyle Miller Sanford
 Albert Christy Santy, Jr.
 Flavia Irene Sarji
 Marjorie Nan Sauber
 Lawrence Craig Saunders
 Michael Arthur Sauter
 William Earl Savage, II
 Lynn Adele Saville
 Zephia Brown Scarborough
 Mark Lloyd Schenley
 Randolph H. Schneider
 Mark Kennedy Schott
 Frederick Arthur Schuenaman
 Cary G. Scott
 Stephen Walter Scott
 Peter W. Seaman
 John Everett Seddelmeyer

Suzanne Seear
 Elizabeth Arledge Seibert
 Peter K. Senechal
 Virginia Ann Senechal
 Bonnie Catherine Sevier
 Andrew Shaw
 Walter L. Sheffield, III
 Larry W. Shelton
 John Stewart Shiner
 Edward Taylor Shipley, Jr.
 Ralph Hemperley Short, Jr.
 Barry Louis Silverman
 Serena Gray Simons
 Francis Philip Graham Singer
 Rani Whitaker Singletary
 William Vance Singletary, Jr.
 Clay Slate, Jr.
 David Smallen
 Alexis Annette Smith
 Byron C. Smith
 Gayle Lorraine Smith
 Gregory L. Smith
 Louise Pearson Smith
 Richard Smurthwaite
 Peter Leigh Snell
 Donald Paul Sommerville, II
 Thomas Everett Sox, Jr.
 John Wesley Spears, Jr.
 Sandra Marie Speidel
 Daniel Lee Sperling
 Jane Sinden Spiegel
 Barbara Bates Spielvogel
 Jeffrey Paul Sprowls
 Carol Christine Stauffer
 Betty Ann Steedley
 Clayton Marshall Steinman
 Woody Van Stenz
 John Randall Dudley Stephens
 Margaret Vivienne Stephens
 Paul Herbert Stock
 Harry C. Stokes
 John Stanley Stolarek, II
 Charles Storch
 Patricia Jane Strainic
 James Stephen Strawinski
 Selah Palmer Stumm
 Leslie Neal Sutton
 Eric Wolfgang Svenson
 Harry A. Swagart, III
 Carolyn Jeannette Swaim
 Susan Lee Swarthout
 Mark McTeague Sweitzer
 H. Robert Switzer, Jr.
 Marguerite Lois Taliaferro
 Lettice Warshavsky Tanchum
 Priscilla Lillian Tate
 Helen Jean Taylor
 Maravene Elizabeth Taylor
 John Francis Terrell, Jr.
 Richard L. Terry
 W. Randolph Teslik
 Debra Ann Thomas
 Barbara Ann Tiley
 Robert Sidney Tillett, Jr.
 Joseph William Tinko, Jr.
 Raymond Joseph Toher, Jr.
 Roy Churchill Towlen
 Byron Roscoe Trauger
 Lewis Hutchison Traver
 Arthur James Tremaine
 Ana Maria Turner
 A. Spencer Turnipseed

Walter William Turyn, Jr.
 Craig Stuart Tymeson
 John Ashby Valentine, III
 R. Bruce Vance
 James Clement Van Pelt, Jr.
 Carolyn Hickman Vaughan
 James Townsend Vaughn, Jr.
 Michael Alan Veatch
 John Chalmers Vinson
 Edward W. Virgin, III
 Paul Edwin Von Nessen
 Kathryn Macon Waggoner
 Joseph David Waggonner, III
 Joel Morris Wagoner
 Ian Spencer Waldie
 William Ruel Walker
 Harold "Mac" Wallace
 Randall Thurman Wallace
 William Emmet Walsh
 Eleanor Ann Ward
 Nancy Lou Bunker Ward
 Genevieve Merrill Ware
 Sally Augusta Watkins
 Patricia Alice Watson
 James Henry Webb
 Lincoln Putman Webb
 Christopher Rowland Webster, Jr.
 Deborah Miller Webster
 Gary Abrams Wein
 Janice Ratliff Welker
 Mark Robert Wellner
 Janice Fitzgerald Wellons
 Hugh Haynsworth Wells, Jr.
 Robert Newton Wells, Jr.
 Ronald Wayne Wells
 Steven Ray Westby
 J. Robert Wheeler
 Stanley William Whetzel, Jr.
 Clair Fox White
 Judith Whitehill
 John David Wigodsky
 Charles Henry Wile
 Donald Lee Wilhelm
 Barbara Sally Williams
 Dale Edward Williams
 Dennis E. Williams
 Donald N. Williams
 Edgar Warren Williams, Jr.
 Emily Frazer Williams
 Stephen Gilbert Williams
 Wayne Lewis Wilson
 Mark Stephen Windisch
 Roger Gilbert Windsor, Jr.
 Nicholas Charles Wingerter
 Carolyn Brown Winkler
 Richard Mark Winters
 Wendy Witherspoon
 Thomas Roy Witt
 Robert Lee Wolfe
 William Alan Wolff
 George Roland Wood
 David Harrison Woodyard
 Ruth Elaine Yackee
 Lin Yeiser
 Carolyn Banks Young
 Gwynne Alice Young
 Mary Ellen Young
 Charles Alger Zapf
 Janet R. Zimmer
 Craig L. Zimmers

Bachelor of Science

James Wade Allen
 David Scott Anderson
 Robin Lee Anderson
 Lida Ruth Angier
 Bertrand Marquess Anz, II
 David Mitchell Appleby
 Luther Kristian Arnold
 Sandra Lea Ayres
 Timothy Stanley Baker
 Jean Wearn Bitter
 Jane Ellen Bohannon
 James Keith Boling, Jr.

Alexis C. Bouteneff
 Edward Glen Britton
 Darrell Richard Brown
 Isaac Byrd
 G. T. Cartier, III
 Jay Steven Cashman
 Frederic W. Chapin
 Janet Lai Chin
 Darryl Edgett Clark
 Robert Hathway Clasen
 Nancy R. Coates
 Jimmy Harold Collins

Cynthia Elizabeth Coulter
 Paul David Crosby
 Diana Lynne Daffin
 Jake Devonshire
 Richard Paul Dibala
 George Davis Edens
 Paul Charles Elliott
 Larry Scott Enoch
 Kenneth Harold Fallar
 Martha Carolyn Farmer
 Candace Mayo Farnham
 Michele Marie Fassino

Kenneth Steedly Folk
 Phillip Charles Galle
 William Hundley Garbee, Jr.
 Thomas Kurt Gerbe
 Mary Louise Getz
 Henry Fred Gober, Jr.
 Michael Steven Goldwasser
 Stephen Thomas Gore
 Beverly Patricia Downing Graham
 Peter Hudson Haas
 John Randolph Hain
 Christine L. Hanson
 Maureen Rebecca Hanson
 Linda Ann Harter
 R. Edward Hedgecock, Jr.
 Marilyn Agnes Hofmann
 Jo Ann Holshouser
 Deborah Lee Horton
 Barbara Meryle Jackson
 Minas C. Joannides, III
 Patricia Lee June
 Charles Kantor
 Andrew David Kligerman
 J. Val Klump
 James E. Kreisle, Jr.
 William James Laws, II
 Edward Henry Lebetkin
 Mark David Lees
 Diana Kay Lemley
 Dora Maratka Lhotsky
 Richard E. Manners
 Sam Thomas Manogian
 Margaret Patrick Marshburn

Paul Mason
 Gary David McAlister
 Michael Rudolph McBride
 Thomas Lee McCarriar, Jr.
 Lawrence Edward McCrone
 Nancy Diane McLaughlin
 Christine Linda Melchior
 Brett Deal Merritt
 Christopher Louise Meyer
 William Tobin Miller
 Thomas Lee Moffatt
 Terry Dowdell Moore
 Stephen Larry Morgan
 Mary Susan Mott
 Lauren Jeane Munro
 Nolan Hicks Newton
 Berl Ray Oakley
 Elon Palaschak
 Theodore Lance Parker
 Irwin Pascual
 Lawrence Vince Phillips, Jr.
 Daniel Avery Pitt
 Archie Ray Portis, Jr.
 Nancy Lee Redfearn
 Robert P. Redinger
 Thomas Raymond Reel
 Michael Leo Reeves
 Silvia Pacin Romero
 Robert Scott Runnion, III
 Teresa Palmer Salter
 Scott Carey Sanborn
 Georgiana Marie Sanders
 Mary Manley Sapp

Paul Walter Scott
 Sheryl Ann Scott
 Thomas Bradshaw Sellers
 William Harry Shaia, Jr.
 Jeffrey Clifford Shivers
 Tarilyn Ann Smythe
 Christine Ann Snartemo
 Susan Faye Snow
 Roger Richard Solomon
 Alan Vernon Stansfield
 John Carson Hay Steele, Jr.
 Darcy Sherwin Stewart
 Betty Sue Stoffregen
 Edith Lynn Storie
 David Lawrence Straight
 Clarence Maxie Templeton, III
 Mary Christine Torington
 Thomas Whitley Uhde
 David Alan Warrick
 Carol J. Watkins
 Mary Jane Watkins
 Mary Dianne Welch
 Geoffrey Lyn Wheeler
 Judith Leigh White
 Stuart Kirkland Wier
 Howard J. Williams, Jr.
 Robert Dean Williams, Jr.
 Lynn Marie Woodard
 Russell Sims Wright
 Barbara Lynn Wuehrmann
 Linda Jane Wulf

Bachelor of Science in Engineering

Lotfi Ahmed Ali
 Robert W. Althaus
 Marion Lee Blount
 Stephen Michael Bonwich
 Robert Eugene Cheney
 William Wade Clarkson
 James Wilkinson Davis
 Henry Reirden Derr
 Truman Dent Donoho, III
 Arthur Lawrence Downes, Jr.
 David Williams Erdman
 Richard Peter Fleming, Jr.
 Glen Murray Gallagher
 Chesley Sylvester Goldston, II
 Vance Donald Gregory, Jr.
 Robert Pendleton Haley, Jr.
 Donald M. Hamada
 John Bill Hanson
 Robert Reeves Hayter
 Laurence Stephen Heard
 John H. Hebrank
 Peter John Heidengren
 Donald Malcolm Helfer
 Thornton Moore Helm, Jr.
 Gary Edward Herman
 Eric Charles Hill
 Jack Cavin Holland

Knut Holte
 William Edward Hubbard, Jr.
 Michael David Jones
 Allen Jay Kasden
 Thomas Kelcec
 John C. Kelley
 Janice Collins Kennerty
 Craig Alan Keplinger
 John Allan Klonick
 Robert Peter Lalor
 Chun Hung Lam
 Angbo Angbo Lucien
 David George Marcelli
 John Stedman Marold
 Thomas D. Matlock
 Thomas D. Matlock
 Thomas Haywood Medlin
 Robert Turnage Monk, Jr.
 Charles Hunter Moricle, Jr.
 Douglas Lord Morris
 James Arthur Nissen
 Robert F. Olivere
 David Hugh Pace
 Michael Charles Parrott
 Douglas Scott Perry
 William Rex Beresford Potter
 David Lynn Pugh

John Robert Rastall
 Curt Arnold Rawley
 James Leroy Reese
 Peter R. Romeyn
 Roger Dana Ross
 John Holley Rudd
 Charles Gaylor Sandell
 William Barton Seith
 Robert Lynn Shinn
 Richard N. Simels
 Charles Madison Skinner
 Jeffrey Orser Smith
 Sydney Duane Southerland, Jr.
 James Lee Stuart
 Allen Floreus Suit
 David Crane Swarts
 Clarence Earl Thomas, Jr.
 Lorenzo Shin Wen Tseng
 William Clair Turner, Jr.
 John Lawrence Waldruff
 Edward S. Warren
 Thomas Linson Warren
 George Joseph White
 Robert Stuart Willig
 Phillip Stuart Wilson

Bachelor of Science in Nursing

Catherine Marie Cook Ayoub
 Nancy Ellen Bray
 Marian Andrews Brenton
 Carolyn Ann Colglazier
 Alice Mildred Colvin
 Ruth Aileen Conn
 Pamela Regan Cooper
 Rebecca Holland Corns
 Judith Reagan Craggs
 Linda Ann Earle
 Jane Virginia Edmunds
 Diane Ellis
 Caryl Ruth Erhardt
 Diane Marie Erickson
 Nancy Jean Frees
 Nancy Fitzgerald Furgurson
 Catherine Lynch Gilliss
 Deborah Anne Godfrey
 Vicki Jean Gwynn
 Wendy Ann Hagstrom
 Christine Harribance

Donna M. Harris
 Carolyn Bruce Harrison
 Katherine Ann Hennessey
 Vennie Susan Hoop
 Margaret Carter Hubbard
 Lynne Elizabeth Johnson
 Lucy Grier Jones
 Mary Jane Christensen Kagarise
 Sharman V. Kasdan
 Julia DuRant Kimbrell
 Karen Lee Kirkland
 Patricia Jane Kramer
 Marlene A. Kraus
 Janet Hughes Lee
 Joan Marie Logan
 Carolyn Averill Miller
 Barbara Nims
 Peggy Dianne Nutwell
 Ellen Hammerlund Peach
 Nancy Alice Peterson
 Susan Jane Pickard

Janet Lois Pohl
 Anne Gose Pope
 Patricia Fair Prather
 Ellen Bretthauer Reed
 Carolyn Pickett Reid
 Susan Elizabeth Robinson
 Jeanne Margery Ross
 Nancy Jane Rowell
 Ann Barr Speicher
 Joan Marlene Stanley
 Elisabeth Stewart
 Mary Williams Stewart
 Mary Williams Stewart
 Mary Lynn Tapager
 Barbara Jean Taylor
 Elaine Marie Uchiyama
 Mary Katherine Wiebmer
 Sue Simpson Wilson
 Virginia Fleming Wiseman
 Suzanne Elaine Young

HONORS AND DISTINCTIONS OF CANDIDATES FOR DEGREES, 1971

The Woman's College and Trinity College

Summa cum laude

William Henry Blackwell, Jr.
Maureen Rebecca Hanson
Mary Louise Getz
Douglas Stringer Brierley
Sheryl Ann Scott
Louise Pearson Smith
Michael Francis Gilligan
Richard Marion Draffin
John Carson Hay Steele, Jr.

Diane Grace Halle
Lettice Warshavsky Tanchum
John Lyndon Newell
Guy Francis Guinn
Leslie Marion Howard
William Tobin Miller
Richard Eugene Manners
Diane Lee Barthel
Kathryn McLean Christie

Rose Lilliston Mason
Deborah Lee Horton
Roger Richard Solomon
Scott Carey Sanborn
Barbara Lynn Wuehrmann
Dora Miroslava Maratka Lhotsky
Robert Denton Meadows
Roger William Lidman

Magna cum laude

Phillip Carl Magnuson
Candace Jo Mayo Farnham
John Mathews Bowers
Rosemary Jann
Lucy Highsmith Caudill
Mary Martha Manley Sapp
Linda Marie Hankins
Andrew David Kligerman
Helen Anne Sadd
Judith Allen Moreland
Patricia Lee June
Charles Kantor
Benjamin Wesley Franklin
Susan Gay Hamilton Nicoll
Nancy Lee Redfearn
Jan Alan Pechenik
Robert Mathew Entman
Gail Camp Huggett
Steven Robert Dottheim
Mary Sharon Gibson
Thomas Roy Witt
Robin Arthur Moore
William Elliott Johnston
Leslie Neal Sutton
Teresa Dreyan Palmer Salter
Clara Hayley Axam
Pamela Bomberger Barry
Laurie Judith Eisenberg
Jeffrey Roberts Lee
Priscilla Lillian Tate
Eugene Holcombe Buckle
Linda Allen Burcher Long
Julie Rose Horvath
Harlan Lary Priour
Linda Jane Wulf
Russ Frank McDonald
Elsie Louise Love
Elizabeth Arledge Seibert
Judith Whitehill
Alan Davis Johnstone
Edward Bryan Samuel
Sarah Alice Ogden
Nancy Beth Nieman
Carolyn Brown Winkler
Helen Jean Taylor

Stuart Kirkland Wier
Douglas Martin Rawlings
Linda Hayes Blair
Florence Daniel Netting
Barbara Ann Funger
Archie Ray Portis, Jr.
Mary Susan Mott
Richard Joseph Hughes
Eleanor Carroll Miller
Darrell Richard Brown
Susan Faye Snow
Douglas Alfred Hastings
Joseph David Waggonner, III
Zephia Brown Scarborough
Steven Alan Meixel
William Fauset McCrady, III
Eleanor Ann Ward
Joseph John Eiden, Jr.
Byron Roscoe Trauger
William Ruel Walker
David Scott Anderson
Jean Elizabeth Alderman
Linda Christine Hand
Barbara Louise Ego
John Stanley Stolarek
Eric Wolfgang Svenson
Mary Borland Long
Kathryn Sue Nordstrom
William David Gaither
John Hinton Parker, Jr.
Elizabeth Grey Ferris
Julia Beth Marquis
Gary David Blake
Andrew Shaw
Henry Niles Nelson, III
Betty Ann Steedley
Charles Philip Storch
Robert Clarke Dunn
Berl Ray Oakley
James Townsend Vaughn, Jr.
Laurence Jay Robbins
Susan Catherine Perten
Edward Glen Britton
Jo Ann Holshouser
Thomas Fleming Fine

Carol Christine Stauffer
Guy Boyd Lucas
John Devereux Kimball
Mark Stephen Windisch
Page Harris McCullough
David Andrew Boone
Timothy Stanley Baker
Marguerite Lois Taliaferro
Bonnie Catherine Sevier
Melinda Nield Irvine
William Joseph Payne
Bonnie Nancye Brown
Mark Jay Kunkel
Mark Sanford McNeil
Diane Lynne Griffith
Anne Marie Zenni McKinney
Joseph Ward Marion
Sandra Marie Speidel
Nick Steven Kaluk, Jr.
George Roberts Gilbert
Jeanne Elizabeth Cockrell Blocher
Richard Paul Dibala
Carol Anne Peden
Stanley Glenn Rockson
Nancy Diane McLaughlin
Jonathan Deaderick Britt
Arion Keith Kemple
Carolyn Fair Brosius
Douglas Perry Dean
Cynthia Elizabeth Coulter
Barbara Ann McIntyre
Christopher Louise Meyer
James Andrew Kruidenier
Jeffrey Val Klump
Margaret Ellen Ashworth
Jean Marie Cary
Dennis Eugene Williams
Susan Hills
Janet Rose Zimmer
Deborah Lynn Darmstaetter
Paul Walter Scott
Daniel Avery Pitt
Allen Kahan

HONORS IN DEPARTMENTS AND SCHOOLS

Departmental Graduation with Distinction

Chemistry

Timothy S. Baker
Robert C. Henderson
John C. Steele, Jr.
Carol J. Watkins
Robert D. Williams, Jr.

Economics

Eugene H. Buckle
Richard S. Carro
William S. Culp
Carolyn B. Fisher
Kenneth E. Larsen
Joseph W. Marion
Nancy B. Nieman
Jerrold B. Pinsker
Alice A. Ratliff
Helen A. Sadd
Jeffrey P. Sprowls

Electrical Engineering

James W. Davis
Chun H. Lam
John L. Waldruff

Mechanical Engineering

Robert P. Haley
Lawrence S. Heard
Thomas Kelcec
Janice C. Kennerty
Curt A. Rawley
Sydney D. Southerland
James L. Stuart
Allen F. Suit
Thomas L. Warren

English

William H. Blackwell, Jr.
John M. Bowers

Laurie J. Eisenberg

Arthur A. Guthrie
Susan Hills
Rosemary Jann
Guy B. Lucas
Russ F. McDonald
Barbara S. Meier
Michael R. Rochelle
Sandra M. Speidel

History

Thomas F. Fine
Robert C. Hall
Douglas A. Hastings
John D. Kimball
Christopher H. Little
John R. Martin
William R. McCune, Jr.
Jay W. Miller

Charles H. Montgomery
Judith A. Moreland
Daniel S. Reinhardt
Andrew Shaw
H. Robert Switzer, Jr.

Interdisciplinary Studies
Charles F. Bond, II
(English and Music)

Mathematics
Mary L. Getz

Music
Jean E. Alderman
Christine Anderson
Priscilla A. Clark
Phillip C. Magnuson

John L. Newell
Edgar W. Williams, Jr.

Political Science
Samuel B. Evans
Arlon K. Kemple
John S. Stolarek, II
Clair F. White
Wayne L. Wilson

Psychology
Betrand M. Anz, II
Janet Chin
Linda A. Harter
Paul Hartmann
Margaret T. Kaluk
Charles Kantor
James E. Kreisle, Jr.

Dora M. Lhotsky
Barbara A. McIntyre
Gary A. Wein
Geoffrey L. Wheeler

Romance Languages
Charles K. Broadhurst, Jr.

Sociology-Anthropology
Pamela Barry
Diane L. Barthel
Diane L. Griffith

Zoology
Candace M. Farnham
Andrew D. Kligerman

Air Force Reserve Officers Training Corps

Distinguished Cadets

Herbert H. Hurst, Jr.

James S. Strawinski

Charles H. Wile

SCHOOL OF ENGINEERING

Summa cum laude

Thomas Kelcec

Clarence Earl Thomas, Jr.

Curt Arnold Rawley

Magna cum laude

Allen Floreus Suit
John Stedman Marold
Michael David Jones

Chun Hung Lam
Thomas Linson Warren
Gary Edward Herman

Marion Lee Blount
Charles Gaylord Sandell
James Wilkinson Davis

Elections to Tau Beta Pi

Marion Lee Blount
James Wilkinson Davis
Donald M. Hamada
Laurence Stephen Heard
Gary Edward Herman
Michael David Jones

Thomas Kelcec
Chun Hung Lam
John Stedman Marold
Thomas Haywood Medlin
David Hugh Pace
Curt Arnold Rawley

Charles Gaylord Sandell
Sydney Duane Southerland, Jr.
Allen Floreus Suit
Clarence Earl Thomas, Jr.
Thomas Linson Warren

SCHOOL OF NURSING

Summa cum laude

Wendy Ann Hagstrom

Magna cum laude

Joan Marlene Stanley
Sharman V. Kasdan
Catherine Marie Cook Ayoub

Joan Marie Logan
Ruth Aileen Conn
Barbara Nims

Carolyn Averill Miller
Nancy Jean Frees

SCHOOL OF MEDICINE

Elections to Alpha Omega Alpha

Gregory Stephen Liptak
Evan Dexter Slater
Lyndon Dale Waugh
Elaine Z. Belmaker
Donald Craig Brater

Walter Herbert Cobbs, III
Holly Wilson Davis
Charles Patrick Hybarger
Georgeanna Seegar Jones
Robert Jay Margolis

John Frederic Modlin
Peter Thomas Scardino
Bernard Spencer Thomas, Jr.

ELECTIONS TO PHI BETA KAPPA

Class of 1971

Diane Lee Barthel
William Henry Blackwell, Jr.
Gary David Blake
John Mathews Bowers
Douglas Stringer Brierly
Eugene Holcombe Buckle
Lucy Highsmith Caudill
Kathryn McLean Christie
Steven Robert Dottheim

Richard Marion Draffin
Robert Clarke Dunn
Barbara Louise Ego
Joseph John Eiden, Jr.
Laurie Judith Eisenberg
Robert Mathew Entman
Candace Jo Mayo Farnham
Thomas Fleming Fine
Benjamin Wesley Franklin

Lee Anne Furlong
William David Gaither
Mary Louise Getz
Mary Sharon Gibson
Michael Francis Gilligan
Guy Francis Guinn
Diane Grace Halle
Maureen Rebecca Hanson
Douglas Alfred Hastings

Gary Edward Herman
Susan Hills
Jo Ann Holshouser
Deborah Lee Horton
Julie Rose Horvath
Leslie Marion Howard
Gail Camp Huggett
Rosemary Jann
William Elliott Johnston
Michael David Jones
Patricia Lee June
Charles Kantor
Thomas Kelcec
John Devereux Kimball
Andrew David Kligerman
Chun Hung Lam
Jeffrey Roberts Lee
Susan Rice Lewis
Roger William Lidman
Linda A. Burcher Long
Elsie Louise Love
Phillip Carl Magnusson
Richard Eugene Manners
John Stedman Marold

Rose Lilliston Masion
Lawrence Edward McCone
Russ Frank McDonald
Robert Denton Meadows
Steven Alan Meixel
Eleanor Carroll Miller
William Tobin Miller
Robin Arthur Moore
Judith Allen Moreland
Mary Susan Mott
John Lyndon Newell
Susan Gay Hamilton Nicoll
Nancy Beth Nieman
Nancy Louise Prothro Norton
Jan Alan Pechenik
Archie Ray Portis, Jr.
Harlan Lary Priour
Curt Arnold Rawley
Douglas Martin Rawlings
Nancy Lee Redfearn
Laurence Jay Robbins
Stanley Glenn Rockson
Helen Anne Sadd
Edward Bryan Samuel

Scott Carey Sanborn
Mary Martha Manley Sapp
Zephia Brown Scarborough
Sheryl Ann Scott
Elizabeth Arledge Seibert
Andrew Shaw
Louise Pearson Smith
Roger Richard Solomon
John Carson Hay Steele, Jr.
Leslie Neal Sutton
Eric Wolfgang Svenson
Priscilla Lillian Tate
John Stanley Stolarek, II
Allen Floreus Suit
Helen Jean Taylor
Clarence Earle Thomas, Jr.
Thomas Linson Warren
Judith Whitehill
Stuart Kirkland Wier
Thomas Roy Witt
Eddie Meek Williams, III
Robert Dean Williams, Jr.

SPECIAL PRIZES AND AWARDS

ACC Plaque for Excellence in Scholarship and Athletics—Curt A. Rawley
American Society of Civil Engineers Prize—Robert Reeves Hayter, David George Marcelli
American Society of Mechanical Engineers Award—Thomas Kelcec
American Public Works Association Prize—Charles Gaylord Sandell
Alice M. Baldwin Scholarship Award—Diane Lee Barthel, Laurie Judith Eisenberg,
Diane Grace Halle, Elsie Louise Love, Sheryl Ann Scott
Evelyn Barnes Memorial Scholarship—Susan Hills
Julia Dale Prize in Mathematics—Mary Louise Getz, Roger Solomon
Delta Delta Delta Scholarship—Janice Kennerty
Dermaquizz Award—Robert William Gilmore
Duke University Department of Chemistry Award—Timothy S. Baker, John C. Steele, Jr.
Anne Flexner Memorial Award for Creative Writing—Second prize: Marguerite Taliaferro
Edward C. Horn Memorial Prize in Zoology—Sheryl Anne Scott
Thomas Jefferson Award—Roberta Kay Beach, John Allen Walker
Lange Medical Publications Award—Douglas Seward Lloyd, Lyndon Dale Waugh
W. T. Laprade History Prize—Robert C. Hall
Robert E. Lee Award—M. Leo Hart, Jr.
Merck Index Award—Leslie M. Howard, John C. Steele
Milmo Award—Douglas Scott Perry
C. V. Mosby Book Award—Walter Carl Maack, John Callison Rawl, Garrett Frank Saikley,
Peter Thomas Scardino
Moseley Award—Mary Wiebmer
North Carolina Association of Certified Public Accountants Medal—Douglas P. Dean
School of Nursing Alumnae Award—Wendy Hagstrom
Outstanding Service Award—Wendy Hagstrom
Panhellenic-Sandals Scholarship—Patricia Ann Kenworthy
Roche Award—Evan Dexter Slater
Henry Schuman Prize for Music—John Lyndon Newell, Edgar Warren Williams, Jr.
Charles Ernest Seager Memorial Award—James Wilkinson Davis
Walter J. Seeley Scholastic Excellence Award—Thomas Kelcec
William Senhauser Prize—Richard Mark Winters
George Sherrerd III Memorial Award in Electrical Engineering—Chun Hung Lam
Upjohn Award—Joseph Benford McCormick

DEGREES AWARDED SINCE THE PREVIOUS ANNUAL COMMENCEMENT DIPLOMAS DATED SEPTEMBER 1, 1970

Bachelor of Arts

Susan Taylor-Albright
Lynne Jeanette Anderson
Anne Marie Belton
Nancy Louise Benoit
Irving Beldner Berenson
William Reid Black
Betty Gail Bosell
Susan Allen Boughton
Shayna Elayne Chamitoff
William Clarkson, IV
Carol Macon Crocker
John Robert Davis, Jr.
Frances Ann Deats
Linda Gean Didow
William Edward Dykstra
Paulette Keith Dyson
Jens Beauford Edwards, Jr.
John E. Fergus, Jr.
William Morris Freeman, Jr.
Lee Anne Furlong
Michael Craig Goerner

David Duane Golden
Susan Terry Griffith
John William Gutekunst
Phillis Elaine Hand
Susan Gillies Hanna
Michael Ann Harris
Donna Lou Hay
Linda Sue Howard
David A. Hunt
William R. Johnson
Lynette Bridget Kuran
Mary Mann Kyle
David George Lange
Susan Rice Lewis
Glen Alton Loudermilk
Martha McDowell Masion
John Albion Monagin, Jr.
Michael Morency
Horace P. Morgan, Jr.
Robert Stuart Morrison
Bahman Nourafshan

Margaret McIntyre Pless
Nancy Louise Prothro
Robert Michael Ressetar
Frederick S. Richardson
Diane Dorland Rixse
Linda Susan Rudich
Mary Chandler Rydzal
Alice Barrow Myrick Scardino
Merlynn Raye Small
Shelley Rebecca Smith
Catharine Callaway Sorrell
Seymour Eugene Teer
William David Vaughn
Roger Andrew Wells
Susan Bowyer Welsh
Paige Louise Wenrich
Eddie Meek Williams, III
Rae Ruckel Williams
Frank Alley Woodall

Bachelor of Science

Gary Walter Ayers
Murray Lewis Brown

Robert Joseph Fowler
Marcellus E. Parham

Thomasine Maria Whitehurst

Bachelor of Science in Engineering

Ronald Loren Black
Ronald Michael Campbell

Thomas Everett Hightower
John Luman Moore, Jr.

Bachelor of Science in Nursing

Heather Flowe Green

Jean Milner Spurlock

TRINITY COLLEGE

Freshman Class Honors 1970-71

Paul Allen Lewis
David Ward Hannon
Bruce April Moyer
Ronald Rovner
Richard Edward Smitherman
Peter Nicholas Helms
Charles Porter Ellington, Jr.
Charles Frederick Cooper, II
Morgan Paul Meyer
David Edward Robinson
Donald Frank Hull, III
David Sprott Boger
Stephen Walter Brewer
Warren Woodson Olds
John Charles Wood
James Anthony Grasso, Jr.
John Edwards Dewar, II
James Marx Iseman, Jr.
Stephen Long Whiteside
Barry Edward Wind
David Clarence Morris
Bruce Gordon Trowbridge
Kenneth Allen Shifrin
Walter Russell Rogers, Jr.
Mei-Ku Huang
David Mark Eisenberg
Henry P. Nathan
Randall Craig Rickard
Bruce Mark Albert
Dana Stuart Pfaff
Daniel Allen Rogers
John Wesley Hutchinson
Daniel Morris Greenberg
Robert Charles Barrett
James Douglas Winthrop
David Wayne Mullenex
Richard Painter Shryock
Adour George Adrouny
Robert Francis Benceze
Nels Robert Leininger
Stephen Arnold Wank
James Marvin Horton
James Ronald Eskew
Thomas David Fuchs
William David Brantley

James S. Peter Beck, III
Michael Tad Hippler
Donald Gene Detweiler
Richard Jon Welch
Steven Robert Savona
Joseph Owen Gehrett, Jr.
David Andrews Dalton
Lawrence J. Ryan
Wayne Richard Kempson
John Wesley Clower
Lawrence David Kaplan
Arthur Glenn Holder
Mark Haas Keeler
William Arthur Kennedy
Edward Steven Lauer
Pedro Nicolas Morales
Steven Forest Roark
David Lee Ross
Gary Helmut Weber
Melville Stewart Brown
David Harold Abbott
Larry Marc Segall
Clifford Howard Nelson, Jr.
Lawrence Morel Jones
John Kermit Gibbons
Donald McGee Etheridge, Jr.
John Stephen Hahn
Victor Balmer Shelburne, III
Douglas Paul Sherman
William Clark St. Amant
John Michael Berry
Jeffrey Lloyd White
Jerry Stewart Apple
Robert Benson Euler
Bruce Roger Genderson
Michael Lee Cooper
Larry Joe Morell
Robert Norman Knight, Jr.
Daniel Patrick McMahon
Albert John Wittmayer Novak, Jr.
Anton Peter Nielsen
Thomas Gordon Hoffman
Dane Harvey Clevon
William Bernice Bunn, III
Clark Anderson Ward

Richard Treherne Tolley, Jr.
Jarvis Dean Brock
Timothy Michael Murray
Euliss Dale Madren
Jesse Michael Colvin
Joseph Tinnie Carruthers, III
Eric Alfred Oristian
Frank Joseph Gadusek
Milton William Frenzel
Paul Norwood Rudolph
George Maret Maxwell
Scott Wilson Loring
John Michael Sowell
Stephen Russell Lewis
William H. Pauley, III
James Lawrence Purdie
Michael Stuart Ives
Alberto Grignolo
Thaddeus Leland Dunn
David Murray Jeuda
James Lanauze Hill
James Gordon Philipson
Timothy Jay Patterson
Thomas Peter Howard
Joel Jay Lerner
Steven Michael Klebanoff
Stephen Hampton Hamrick
Marshall Lewis Fay
Ben Cox Garrett
Madison Stockton Spach, Jr.
John Constantine Calomiris
Thomas Blumeyer Weaver
John Martin Robinson
Ronald Evan Barab
Elliot Scott Auerhahn
Joseph Allen Boone
Thomas Craig Evans
Bruce Lee Homer
David Franklin Smith
Steven Paul Puce
Mark Raymond Walling
Stephen Charles Kurachek
William Frank Monroe

Sophomore Class Honors 1970-71

James Thomas Parsons
Joseph Mikesell Thomas
Glenn Richard Reichardt
Charles Rufus Beaudrot, Jr.
Mark Steven Gorovoy
Jan Tore Hall
Mark William Denny
John Daniel Kennedy, Jr.
Robert Reed McCutcheon, Jr.
Mark Joseph Gotay
John Curtis Platt
Joseph Gregory Polanik
James Lewis Stiepan
Charles Franklin Ramsey, Jr.
Dean David Sloan
Cleveland Kent Evans
Harry Hokey Harkins, Jr.
Waldo Emerson Martin, Jr.
Robert Alexander Wason, IV
Mitchel Allen Kanter
Gregg Allen Friedman
Henry Manville Beck, Jr.

Terry Gregory Patrick Kane
Rudolph Conrad Schweizer
David Ansten Schoenholz
Christopher Barkley Lewis
Ben Harrison Logan, III
Peter Richard Kramer
Jeffrey Clark Smith
Paul Graber Saunders, II
Ralph Lawrence Kugler
Raymond Douglas Kiser
Edward Marshall Hanson, Jr.
Michael Kevin Madden
James Robert William Bayes
Karl Curtis Saunders
James Andrew Retter
Todd Charles Bishop
Christopher Lee Mattil
Marshall Craig Mintz
Daniel Hatheway Donovan
Stanley Nelson Webster
Carl Linwood Gardner
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East Campus

-

West Campus

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Bulletin of Duke University 1972-1973

Directory of
Officers, Faculty,
and Staff



Bulletin of Duke University

**Directory of
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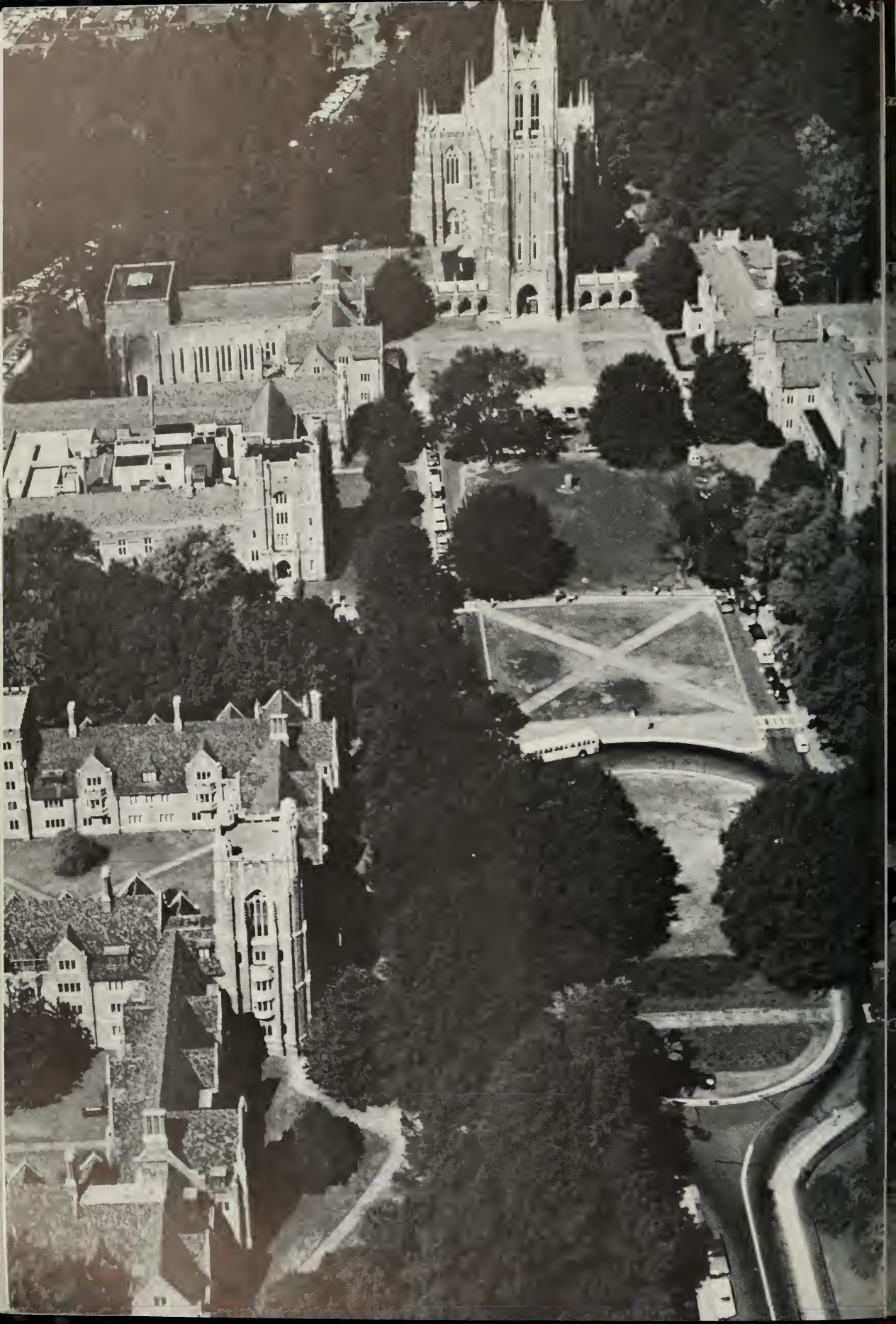
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Officers, Faculty, and Staff

1971-72

The Corporation

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719 W. Cornwallis Road

*Faculty member.

†Student member.

¹On leave through 8-31-72.

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³Deceased 10-17-71.

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^{3a}Deceased 1-29-72.

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(The date in parentheses indicates the year of appointment.)

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⁴Deceased 8-15-71.

⁵Through 8-31-71.

⁶Through 4-15-71.

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- ⁹Hans W. Baade (1960), LL.M. (Duke)
Professor of Law 2512 North Duke Street
- Robert J. Bache (1971), M.D. (Harvard)
Assistant Professor of Medicine 3608 Suffolk Street
- Kurt W. Back (1959), Ph.D. (Massachusetts Institute of Technology)
Professor of Sociology and Professor of
Medical Sociology in Department of Psychiatry 2735 McDowell Road
- ¹⁰Joseph Randle Bailey (1946), Ph.D. (Michigan)
Professor of Zoology 2517 Sevier Street

⁷Sabbatical leave 1971-72.

⁸Through 12-31-71.

⁹Through 8-31-71.

¹⁰Sabbatical leave, fall 1971-72.

- Lloyd R. Bailey (1971), Ph.D. (Hebrew Union Coll.)
Associate Professor of Old Testament 4122 Deepwood Circle
- Frank Baker (1960), Ph.D. (Hull)
Professor of English Church History 1505 Pinecrest Road
- Lenox Dial Baker (1937), M.D. (Duke)
Professor of Orthopaedic Surgery Box 3706, Duke Hospital
- ¹¹Georges L. Balandier (1970), Ph.D.
Visiting Professor of Sociology and Anthropology and
Ford Foreign Scholar 2406 Wrightwood Avenue
- Marie Baldwin (1949), M.D. (South Carolina)
Assistant Professor of Psychiatry Highland Hospital
 Asheville, N. C.
- Steven W. Baldwin (1970), Ph.D. (California Technical Institute)
Assistant Professor of Chemistry 3917 Inwood Drive
- Helmy H. Baligh (1967), Ph.D. (California)
Professor of Management Sciences 1909 Rolling Road
 Chapel Hill, N. C.
- ¹²M. Margaret Ball (1963), Ph.D. (Stanford)
Professor of Political Science 2305 Elmwood Avenue
- Robert H. Ballantyne (1962), Ed.D. (Washington State)
Associate Professor of Education 2510 Wrightwood Avenue
- Bruce R. Banks (1970), M.S. (George Washington University)
Visiting Associate Professor of Naval Science 3421 Cromwell Road
- Richard T. Barber (1970), Ph.D. (Stanford)
Associate Professor of Zoology 307 Ann Street
 Beaufort, N. C.
- Sarah Kathryn Barclay (1965), M.S.S. (Tulane)
Assistant Professor of Psychiatric Social Work Apartment 18-D
 2820 Chapel Hill Road
- Earl Francis Baril (1969), Ph.D. (Connecticut)
Assistant Professor of Clinical Pharmacology 2519 Pickett Road
- ¹³Robert Barker (1970), Ph.D. (California at Berkeley)
Visiting Professor of Biochemistry Apartment 7E
 1600 Anderson Street
- ¹⁴Norman Howard Barlow (1955), Ph.D. (Duke)
Assistant Professor of Romance Languages 3852 Somerset Drive
- Robert L. Barnes (1965), Ph.D. (Duke)
Professor of Forest Biochemistry 5303 Revere Road
- ¹⁵Jean Scott Barr (1969), M.S. (Case Western Reserve)
Associate in Physical Therapy 121 Whitfield Road
- Roger Coke Barr (1969), Ph.D. (Duke)
Assistant Professor of Pediatrics and Biomedical Engineering 121 Whitfield Road
- ¹⁶Louis A. Barre, III (1969), B.S. (Centenary)
Professor of Aerospace Studies Apartment 16
 2330 Hilton Avenue
- William Barry, Jr. (1955), M.D. (Pennsylvania)
Professor of Radiology and Assistant Professor of
Medicine 2713 McDowell Street
- Reiner Alfred Bass (1971), Ph.D. (Univ. of Stuttgart, Germany)
Visiting Professor of Physics 2202 Pike Street
- Frank Houston Bassett, III (1963), M.D. (Louisville)
Associate Professor of Orthopaedic Surgery and
Assistant Professor of Anatomy 3940 Dover Road
- ¹⁷Doris Reece Bates (1970), M.S.N. (Duke)
Instructor in Nursing 117 Purefoy Road, Apartment 3
 Chapel Hill, N. C.

¹¹Through 5-31-71.

¹²Sabbatical leave, fall 1971-72.

¹³Through 8-31-71.

¹⁴Sabbatical leave, fall 1971-72.

¹⁵Through 9-1-71.

¹⁶Through 6-30-71.

¹⁷Through 8-31-71.

- Joseph Battle (1970), Ph.D. (Michigan)
Associate Professor of Business Administration 1800 Primrose Place
- George J. Baylin (1939), M.D. (Duke)
Professor of Radiology and Associate in Anatomy 2535 Wrightwood Avenue
- William Waldo Beach (1946), B.D., Ph.D. (Yale)
Professor of Christian Ethics 130 Pinecrest Road
- Dorothy Waters Beard (1938), R.N. (Vanderbilt)
Associate in Surgery Route 3
Hillsborough, N. C.
- ¹⁸Joseph Willis Beard (1937), M.D. (Vanderbilt)
James B. Duke Professor of Surgery and Professor of Virology Route 3
Hillsborough, N. C.
- Richard C. Bechtel, Jr. (1971), M.D. (Duke)
Associate in Obstetrics and Gynecology 801 Hudson Avenue
- Victor S. Behar (1968), M.D. (Duke)
Assistant Professor of Medicine 1821 Woodburn Road
- ¹⁹A. Richard Bellamy (1971), Ph.D. (Univ. of Auckland, New Zealand)
Visiting Associate Professor of Microbiology & Immunology Apartment 7-E
1600 Anderson Street
- ²⁰William R. Bender (1970), M.D. (Duke)
Associate in Radiology Apartment 7
18 Balmoray Court
- Theodore M. Benditt (1970), M.A., LL.B. (Pennsylvania)
Instructor of Philosophy 1006 Trinity Avenue
- Robert E. Benway (1967), M.D. (Miami)
Assistant Professor of Anesthesiology 2514 Tryon Road
- ²¹Amor Benyoussef (1971)
Visiting Associate Professor of Sociology
- Jan Agar Bergeron (1969), V.M.D. (Pennsylvania)
Assistant Professor of Anatomy 2816 Cornwallis Road
- Frederick Bernheim (1930), Ph.D. (Cantab.)
James B. Duke Professor of Pharmacology 115 Woodridge Drive
- Mary Liliast Christian Bernheim (1930), Ph.D. (Cantab.)
Professor of Biochemistry 115 Woodridge Drive
- Marvin H. Bernstein (1971), Ph.D. (California at Los Angeles)
Temporary Instructor in Zoology 1900 Glendale Avenue
- Helga Wilde Bessent (1964), M.A. (Vanderbilt)
Assistant Professor of German 2117 Englewood Avenue
- ²²Larry E. Beutler (1970), Ph.D. (Nebraska)
Assistant Professor of Medical Psychology in the Department of Psychiatry 48B Worthwood Road
Asheville, N. C.
- Helen Smith Bevington (1943), M.A. (Columbia)
Professor of English 4428 Guess Road
- ²³Lawrence C. Biedenharn, Jr. (1961), Ph.D. (Massachusetts Instit. of Tech.)
Professor of Physics 2716 Sevier Street
- ²⁴Helen Frances Bigler (1969), D.N.S.C. (Boston Univ.)
Assistant Professor of Nursing 2835 Stuart Drive
- William Dwight Billings (1952), Ph.D. (Duke)
James B. Duke Professor of Botany 1628 Marion Avenue
- Edward G. Bilpuch (1962), Ph.D. (North Carolina at Chapel Hill)
Professor of Physics 106 Cherokee Circle
Chapel Hill, N. C.
- Warren P. Bird (1968), M.S.L.S. (Columbia)
Assistant Professor of Medical Literature Apartment 10
2007 House Avenue

¹⁸Retired 8-31-71.

¹⁹Through 12-31-71.

²⁰Through 6-30-71.

²¹Through 5-31-71.

²²Through 8-27-71.

²³Sabbatical leave, spring 1971-72.

²⁴Through 8-31-70.

- ²⁵Asa Orin Bishop, Jr. (1971), Ph.D. (Clemson)
Visiting Professor of Information Sciences in the 1112 Venice Road
Department of Psychiatry Knoxville, Tenn.
 John A. Bittikofer (1970), Ph.D. (Purdue)
Associate in Clinical Biochemistry Apartment 20-I
 311 South LaSalle Street
 David E. Black (1969), (Massachusetts Instit. of Tech.)
Assistant Professor of Economics 1829 Front Street, Apartment D-15
 Martin Lee Black, Jr. (1930), M.B.A. (Northwestern), C.P.A.
Professor of Accounting in the Department of
Management Sciences 135 Pinecrest Road
 John O. Blackburn (1962), Ph.D. (Florida), C.P.A.
Professor of Economics 208 Pineview Road
 Frances Blackwell (1969), M.N. (Florida)
Assistant Professor of Nursing Apartment 14
 300 West Trinity Avenue
 Robert Lincoln Blake (1949)
Associate in Medical Art in the
Division of Audiovisual Education 609 Ruby Street
²⁶Robert G. Blaker (1968), Ph.D. (Pennsylvania)
Assistant Professor of Pathology 3511 Courtland Drive
 G. Douglas Blenkarn (1971), M.D. (Toronto)
Assistant Professor in the Department of
Anesthesiology and Assistant Professor of Pharmacology 2117 Bedford Street
 Jacob Joseph Blum (1962), Ph.D. (Chicago)
Professor of Physiology 2525 Perkins Road
²⁷Edna May Blumenthal (1963), B.S. (Cincinnati)
Associate in Physical Therapy 910 Lambeth Circle
 John P. Boineau (1965), M.D. (Duke)
Associate Professor of Pediatrics and Associate
Professor of Medicine 2802 Legion Avenue
 Dani P. Bolognesi (1971), Ph.D. (Duke)
Assistant Professor of Experimental Surgery and
Assistant Professor of Virology Apartment 11-B
 600-3 LaSalle Street
 Robert A. Bonar (1959), Ph.D. (California)
Associate Professor of Biophysics in
Department of Surgery Route 2, Box 407-A
 Chapel Hill, N. C.
 Allan Hadley Bone (1944), M.M. (Eastman)
Professor of Music 2725 Sevier Street
 James Bonk (1959), Ph.D. (Ohio State)
Associate Professor of Chemistry 112 Pinecrest Road
 Jack W. Bonner, III (1971), M.D. (Texas)
Associate in Psychiatry 120 Kimberly Avenue
 Asheville, N. C.
 Cazlyn Green Bookhout (1935), Ph.D. (Duke)
Professor of Zoology 1307 Alabama Avenue
 Elizabeth Circle Bookhout (1932-43; 1945), Ph.D. (New York)
Professor of Physical Education 1307 Alabama Avenue
²⁸Frank L. Borchardt (1971), Ph.D. (Johns Hopkins)
Associate Professor of Germanic Languages Department of Germanic Languages
 Lloyd J. Borstelmann (1953), Ph.D. (California)
Professor of Psychology and Professor of Medical Psychology
in the Department of Psychiatry 2506 Francis Street
²⁹James M. Boughton (1969), Ph.D. (Duke)
Visiting Assistant Professor of Economics 2727 Spencer Street

²⁵Through 8-31-71.

²⁶Through 4-15-71.

²⁷Retirement 5-1-71.

²⁸Leave of absence, 1971-72.

²⁹Through 5-31-70.

- Shirley Elaine Potts Bourbous (1970), M.S.N. (North Carolina at Chapel Hill)
Instructor in Nursing 2132 Bedford
- Nancy Bowers (1965), Ph.D. (Columbia)
Assistant Professor of Sociology 1408 Duke University Road
- ³⁰Ruth M. Bowers (1967), M.A. (Chicago)
Associate Professor of Nursing 5114 Shady Bluff Street
- Francis Ezra Bowman (1945), Ph.D. (Harvard)
Professor of English 2114 Woodrow Street
- J. E. Boynton (1968), Ph.D. (California at Davis)
Assistant Professor of Botany 1808 Woodburn Road
- William Dalton Bradford (1966), M.D. (Western Reserve)
Associate Professor of Pathology and
Assistant Professor of Pediatrics 3724 Hope Valley Road
- David Gilbert Bradley (1949), Ph.D. (Yale)
Professor of Religion 2507 Sevier Street
- ³¹Keith R. Bradley (1970), M.A. (Sheffield)
Instructor in Classical Studies 1102 Monmouth Avenue
- Charles Kilgo Bradsher (1939), Ph.D. (Harvard)
James B. Duke Professor of Chemistry 118 Pinecrest Road
- ³²Ralph Braibanti (1953), Ph.D. (Syracuse)
James B. Duke Professor of Political Science 3805 Darby Road
- Robert Griffin Brame (1970), M.D. (North Carolina at Chapel Hill)
Associate Professor in the Department of
Obstetrics and Gynecology 21-B Holly Hill Apartments
- ³³Ralph Brauer (1966), Ph.D. (Rochester)
Professor of Physiology and Pharmacology 7205 Wrightsville Avenue
Wilmington, N. C.
- ³⁴Ruth Stevens Braun (1970), M.S. (California)
Instructor in Nursing Homestead Motel
- Joan B. Breedlove (1970), M.S.N. (Duke)
Instructor in Nursing Route 7, Box 169
- Patrick J. Breen (1967), F.F.A. (Royal College of Surgeons, Dublin)
Assistant Professor of Anesthesiology 1012 Norwood Avenue
- Jack W. Brehm (1958), Ph.D. (Minnesota)
Professor of Psychology 1511 Pinecrest Road
- Mary Lee Brehm (1969), Ph.D. (North Carolina)
Assistant Professor of Medical Sociology in the
Department of Psychiatry and Assistant Professor
of Sociology 1212 Roosevelt Drive
Chapel Hill, N. C.
- Marianne Breslin (1968), M.D. (Medical Academy, Dusseldorf, Germany)
Associate Professor of Psychiatry 1604 Michaux Rd., Chapel Hill, N. C.
- Bernard Bressler (1954), M.D. (Washington)
Professor of Psychiatry 2700 Circle Drive
- David A. Brewer, M.D. (1969), (Oklahoma)
Associate in Medicine 2811 Stuart Drive
- Gert Henry Brieger (1970), Ph.D. (Johns Hopkins)
Associate Professor of Community Health Sciences and
Associate Professor of the History of Medicine 2742 Circle Drive
- William H. Briner (1970), B.S. (Temple)
Assistant Professor of Radiology 3100 Ithica Street
- Mary S. Britt (1969), M.S. (Bowman Gray)
Associate in Pathology 2 Maxwell Road
Chapel Hill, N. C.

³⁰Leave of absence, 9-1-71 through 8-31-73.

³¹Through 8-31-71.

³²Sabbatical leave, spring 1971-72.

³³Through 11-1-71.

³⁴Through 8-31-71.

- Irwin A. Brody (1964), M.D. (Pennsylvania)
Associate Professor of Neurology in the
Department of Medicine Route 1
Hillsborough, N. C.
- Martin Bronfenbrenner (1971), Ph.D. (Chicago)
William R. Kenan Professor of Economics 2915 Friendship Road
- ³⁵Vartkes L. Broussalian (1969), Ph.D. (California at Los Angeles)
Visiting Professor of Economics 2733 Sevier Street
- Charlotte Vestal Brown (1971), A.B. (North Carolina at Greensboro) 1206 Wilkinson Drive
Visiting Lecturer in Art Raleigh, N. C.
- Earl I. Brown, II (1960), Ph.D. (Texas)
J. A. Jones Professor of Civil Engineering 1631 Marion Avenue
- ³⁶Frances Campbell Brown (1931), Ph.D. (Johns Hopkins)
Professor of Chemistry 1205 Dwire Place
- George W. Brumley, Jr. (1967), M.D. (Duke)
Assistant Professor of Pediatrics 3318 Devon Road
- Dorothy J. Brundage (1968), M.N. (Emory)
Assistant Professor of Nursing Route 2, Box 258
Mebane, N. C.
- ³⁷Leon James Bruner (1971), Ph.D. (Chicago)
Visiting Professor of Physiology Apartment 51-B
Colonial Apartments
- ³⁸Pieter J. Brussaard (1970), Ph.D. (Leiden Univ.)
Senior Foreign Scientist Fellow, Physics 3406 Ogburn Court
- Anne-Marie Bryan (1961), M.A.T. (Duke)
Assistant Professor of Romance Languages Apartment 28F
Valley Terrace Apartments
- Paul Robey Bryan, Jr. (1951), Ph.D. (Michigan)
Associate Professor of Music 1108 Watts Street
- ³⁹Edwin Constant Bryson (1931), LL.B. (Oregon)
Professor of Law and Professor of Legal Medicine Apartment A-6
Croasdaile Apartments
- C. Edward Buckley (1963), M.D. (Duke)
Associate Professor of Medicine and Assistant Professor of
Microbiology and Immunology 3621 Westover Road
- Rebecca Hatcher Buckley (1968), M.D. (North Carolina)
Assistant Professor of Pediatrics and Assistant
Professor of Immunology 3621 Westover Road
- Louis J. Budd (1952), Ph.D. (Wisconsin)
Professor of English 2753 McDowell Street
- Albert George Buehler (1955), M.A. (North Carolina)
Associate Professor of Physical Education 1718 Woodburn Road
- John Buettner-Janusch (1965), Ph.D. (Michigan)
Professor of Anatomy and Professor of Zoology 1528 Hermitage Court
- ⁴⁰Roger J. Bulger (1970), M.D. (Harvard)
Professor of Community Health Sciences and
Associate Professor of Medicine 3912 Nottaway Road
- Elizabeth Bullock (1968), M.M. (North Carolina)
Assistant Professor of Music E-5 Castillian Villa
Chapel Hill, N. C.
- Grace Bullock (1957-59; 1967), M.S.N. (North Carolina)
Assistant Professor of Nursing 3729 Hermine Street
- J. Gordon Burch (1971), M.D. (Univ. of Alberta, Canada)
Associate in Medicine 1017 Anderson Street
- Donald S. Burdick (1962), Ph.D. (Princeton)
Associate Professor of Mathematics 108 Emerald Circle

³⁵Through 5-31-71.

³⁶Sabbatical leave, fall 1971-72.

³⁷Through 6-30-71.

³⁸Through 8-31-71.

³⁹Retired 9-1-71.

⁴⁰Through 12-31-71.

- Walter W. Burford (1970), B.D. (Yale)
Assistant Professor of Religion 922 Plum Street
- Peter Burian (1968), M.A. (Princeton)
Assistant Professor of Classical Studies 1610 Delaware Avenue
- Edwin Burmeister (1971), Ph.D. (Massachusetts Instit. of Tech.)
Visiting Professor of Economics 2524 Wrightwood Avenue
- Richard O. Burns (1964), Ph.D. (Illinois)
Associate Professor of Microbiology 3909 Kelly Drive
- Richard M. Burton (1970), D.B.A. (Illinois)
Associate Professor of Business Administration 2432 Tryon
- Ewald W. Busse (1953), M.D. (Washington)
J. P. Gibbons Professor of Psychiatry 1132 Woodburn Road
- Ronald R. Butters (1967), Ph.D. (Iowa)
Assistant Professor of English 1013 Rosehill Avenue
- Gale H. Buzzard (1957), Ph.D. (North Carolina State)
Assistant Professor of Mechanical Engineering 2716 Tryon Road
- ⁴¹William D. Caffrey (1971), LL.B. (Indiana)
Visiting Lecturer of Law 1910 Efland Drive
Greensboro, N. C.
- John B. Cahoon, Jr. (1958) R.T. (Duke)
Assistant Professor of Radiologic Technology 2418 Perkins Road
- Clark Cahow (1968), Ph.D. (Duke)
Assistant Professor in the Faculty of Arts and Sciences 1106 Watts Street
- Jasper Lamar Callaway (1937), M.D. (Duke)
James B. Duke Professor of Dermatology 828 Anderson Street
- Edmund McCullough Cameron (1926), A.B. (Washington & Lee)
Director of Physical Education and Athletics 2818 Chelsea Circle
- Ramon V. Canent (1965), M.D. (Santo Tomas, Manila)
Associate Professor of Pediatrics 3314 Waterbury Drive
- Peter Carbone (1966), Ed.D. (Harvard)
Associate Professor of Education 111 Benrose Circle
- Leonard Carlitz (1932), Ph.D. (Pennsylvania)
James B. Duke Professor of Mathematics 2303 Cranford Road
- David Williams Carpenter (1929), Ph.D. (Duke)
Professor of Physics 137 Pinecrest Road
- Dwight W. Carpenter (1966), Ph.D. (Illinois)
Assistant Professor of Physics 908 Urban Avenue
- Robert C. Carson (1960), Ph.D. (Northwestern)
*Professor of Psychology and Professor of Medical Psychology
in Department of Psychiatry* 3030 Glendale Avenue
- James H. Carter (1971), M.D. (Howard Univ.)
Associate in Psychiatry and Macy Faculty Fellow 1003 Stancil Drive
Raleigh, N. C.
- Reginald D. Carter (1971), Ph.D. (Bowman Gray)
Assistant Professor of Physiology Route 1
Hillsborough, N. C.
- Matthew Cartmill (1969), Ph.D. (Chicago)
*Assistant Professor of Anatomy and Assistant Professor
of Anthropology* Route 1
Box 329A
- William H. Cartwright (1951), Ph.D. (Minnesota)
Professor of Education 3610 Britt Street
- Ernesto G. Caserta (1970), Ph.D. (Harvard)
Assistant Professor of Romance Languages Apartment 19F
2748 Middleton Street
- Ronald Casson (1971), Ph.D. (Stanford)
Assistant Professor of Sociology and Anthropology Apartment 25-E
2752 Middleton Street
- Thomas R. Cate (1968), M.D. (Vanderbilt)
Associate Professor of Medicine 3123 Camelot Court

⁴¹Through 5-31-71.

- G. S. Terence Cavanagh (1962), B.L.S. (McGill)
Professor of Medical Literature Apartment F-8
 1200 Leon Street
- Patrick J. Cavanaugh (1960), M.D. (St. Louis)
Professor of Radiology Route 1, Box 171
 Mt. Sinai Road
- Jesse Oscar Cavenar (1971), M.D. (Arkansas)
Associate in Psychiatry 411 Overland Drive
 Chapel Hill, N. C.
- John W. Cell (1962), Ph.D. (Duke)
Associate Professor of History 2101 Dartmouth Drive
- Jack B. Chaddock (1966), Sc.D. (Massachusetts Instit. of Tech.)
Professor of Mechanical Engineering 2713 Spencer Street
- William H. Chafe (1971), Ph.D. (Columbia)
Assistant Professor of History 820 Tinkerbell
 Chapel Hill, N. C.
- Leon E. Chaiken (1952), M.F. (Cornell)
Professor of Forest Management 2737 Dogwood Road
- Arthur C. Chandler, Jr. (1965), M.D. (Duke)
Associate Professor of Ophthalmology and Associate in Anatomy 3508 Cambridge Road
- ⁴²Tze Isaac Chao (1969), B.D. (McCormick Seminary)
Lecturer in Chinese 2528 Sevier Street
- ⁴³Norman B. Chapman (1971), Ph.D. (Cambridge)
Visiting R. J. Reynolds Professor of Chemistry Graduate Center
- Roger C. Chapman (1969), M.A. (California at Berkeley)
Assistant Professor of Forest Biometry 5141 Norman Place
 Raleigh, N. C.
- James H. Charlesworth (1969), Ph.D. (Duke)
Assistant Professor of Religion Route 8, Tomahawk Trail
- ⁴⁴Linda Charnes (1968), M.N. (Florida)
Instructor in Fundamentals in School of Nursing 104B Colonial Apartments
- Stephen I. Chavin (1971), M.D. (Rochester)
Assistant Professor of Medicine 704 Landerwood Lane
 Chapel Hill, N. C.
- James T. T. Chen (1965), M.D. (National Defense Med. Center, Taipei, Taiwan)
Associate Professor of Radiology 2528 Sevier Street
- ⁴⁵Ronald W. Chen (1962), Ph.D. (California)
Assistant Professor of Experimental Surgery 1011 Anderson Street
- ⁴⁶Donald B. Chesnut (1965), Ph.D. (California Instit. of Tech.)
Professor of Chemistry 4404 Malvern Road
- Arthur Christakos (1963), M.D. (South Carolina)
Associate Professor of Obstetrics and Gynecology
and Associate Professor of Community Health Sciences 2608 Winton Road
- George C. Christie (1967), S.J.D. (Harvard)
Professor of Law 1632 University Drive
- Giorgio Ciompi (1964), M.A. (Paris Conservatory)
Artist in Residence in the Department of Music 3614 Westover Road
- James R. Clapp (1963), M.D. (North Carolina)
Associate Professor of Medicine Route 3
 4030 King Charles Street
- Elon Henry Clark (1934)
Professor of Medical Art in the
Division of Audiovisual Education 801 West Maynard Avenue
- Henry B. Clark (1966), Ph.D. (Yale)
Associate Professor of Religion 3108 Camelot Court
- Howard Clark (1968), Ph.D. (Maryland)
Associate Professor of Mechanical Engineering
and Biomedical Engineering 2716 Eton Road

⁴²Through 5-31-71.

⁴³Through 8-31-71.

⁴⁴Through 8-31-71.

⁴⁵Through 12-31-70.

⁴⁶Sabbatical leave, spring 1971-72.

- ⁴⁷Lelia Ross Clark (1949), M.A. (Columbia)
Professor of Nursing Service 1506 Woodland Drive
- ⁴⁸Peter B. Clark (1967), Ph.D. (Massachusetts Instit. of Tech.)
Assistant Professor of Economics 150 Alabama Avenue
 Austin Clarke (1971)
Lecturer in Black Studies Program Apartment D
 1803 House Avenue
 Frederic N. Cleaveland (1971), Ph.D. (Princeton) 1822 North Lakeshore Drive
Professor of Political Science Chapel Hill, N. C.
- Edward Clifford (1965), Ph.D. (Minnesota)
Associate Professor of Medical Psychology in the
Department of Psychiatry and Associate Professor
of Psychology in Plastic Surgery in the Department
of Surgery 2535 Sevier Street
- Frank W. Clippinger (1957), M.D. (Washington)
Professor of Orthopaedic Surgery 3514 Rugby Road
- G. Wayne Clough (1969), Ph.D. (California)
Assistant Professor of Civil Engineering 1108 Anderson Street
- ⁴⁹John L. E. Clubbe (1966), Ph.D. (Columbia)
Associate Professor of English 209 Watts Street
 John M. Clum (1966), Ph.D. (Princeton)
Assistant Professor of English Box 6725
 College Station
- Frederick R. Cobb (1971), M.D. (Mississippi)
Associate in Medicine 4020 Deepwood Circle
- Harry M. Cocowitch (1967), B.S. (Alabama)
Professor of Naval Science 523 Continental Drive
- David Coder (1970), Ph.D. (Cornell)
Assistant Professor of Philosophy 1026 Monmouth Avenue
 Harvey J. Cohen (1971), M.D. (State Univ. of New York)
Associate in Medicine Apartment 11-E
 600-3 LaSalle Street
- John Coie (1968), Ph.D. (California at Berkeley)
Assistant Professor of Psychology 2801 Dogwood Road
- Robert Taylor Cole (1935), Ph.D. (Harvard)
James B. Duke Research Professor of Political Science 7 Sylvan Road
- T. Boyce Cole (1969), M.D. (North Carolina)
Assistant Professor of Otolaryngology 223 Pineview Road
- Andrew P. Collins (1969), M.S.D. (Washington)
Assistant Professor of Orthodontics 1908 Cedar Street
- Joel G. Colton (1947), Ph.D. (Columbia)
Professor of History 1616 Pinecrest Road
- Robert Merle Colver (1953), Ed.D. (Kansas)
Associate Professor of Education 2720 Circle Drive
 Norman Francis Conant (1935), Ph.D. (Harvard)
James B. Duke Professor of Microbiology Route 7, Box 335
 Garrett Road
- Judith Conger (1971), Ph.D. (Illinois)
Visiting Assistant Professor of Psychology 311 Estes Drive
 Chapel Hill, N. C.
- ⁵⁰Hewlette Connell (1968), M.D. (Med. Coll. of Georgia)
Assistant Professor in Radiology 2617 McDowell Road
 Apartment 13B
- ⁵¹Gerald C. Connolly (1970), M.D. (Georgetown)
Associate in the Department of Community Health Sciences 200 Seven Oaks Road
 Frank Convery (1971), Ph.D. (State Univ. of New York)
Assistant Professor of Forest Resource Economics Apartment 10-D.
 2112 Broad Street

⁴⁷Sabbatical leave 7-1-71 through 12-31-71; and leave of absence 1-1-72 through 6-30-72.

⁴⁸Leave of absence, 1971-72.

⁴⁹Leave of absence, 1971-72.

⁵⁰Through 8-31-71.

⁵¹Through 9-7-71.

- ⁵²Robert L. Cook (1965), Ph.D. (Notre Dame)
Assistant Professor of Physics 904 Murray Street
- Samuel D. Cook (1966), Ph.D. (Ohio State)
Professor of Political Science 2733 Sevier Street
- Wesley A. Cook, Jr. (1971), M.D. (Oregon)
Assistant Professor of Neurosurgery 3200 Oxford Drive
- Hallie M. Coppedge (1966), M.S.W. (North Carolina)
Associate in Psychiatric Social Work 3435 Cromwell Road
- ⁵³Thomas Howard Cordle (1950), Ph.D. (Yale)
Professor of Romance Languages 916 West Markham Avenue
- Roger J. Corless (1970), B.D. (London)
Instructor of Religion Apartment 16
1212 Duke University Road
- Bruce A. Corrie (1965), P.E.D. (Indiana)
Assistant Professor of Physical Education Apartment 16
3223 Haddon Road
- Philip Costanzo (1968), Ph.D. (Florida)
Assistant Professor of Psychology 2425 Wrightwood Avenue
- John D. Costlow (1959), Ph.D. (Duke)
Professor of Zoology 201 Ann Street
Beaufort, N. C.
- Sheila J. Counce (1968), Ph.D. (Edinburgh)
Assistant Professor of Anatomy 3101 Camelot Court
- Dario A. Covi (1970), Ph.D. (New York)
Professor of Art 1010 Monmouth Avenue
- R. Merritt Cox (1966), Ph.D. (Wisconsin)
Assistant Professor of Romance Languages Apartment B-14
1829 Front Street
- Robert Calvin Cox (1942), M.A. (Columbia)
Associate Professor of Physical Education 1913 University Drive
- William T. Creasman (1970), M.D. (Baylor)
Assistant Professor of Obstetrics and Gynecology 2944 Friendship Road
- Marion Carlyle Crenshaw (1964), M.D. (Duke)
*E. C. Hamblen Associate Professor of Reproductive
Biology and Family Planning, Assistant Professor of
Pediatrics and Associate in Physiology* Route 8, Box 161
Roxboro Road
- Jon Christopher Crocker (1966), Ph.D. (Harvard)
Associate Professor of Anthropology Route 1, Box 214
Hillsborough, N. C.
- ^{53a}Kathryn Crossland (1967), Ed.D. (Florida)
Professor of Nursing 3326 Pinafore Drive
- ⁵⁴Elaine Kobrin Crovitz (1965), Ph.D. (Duke)
*Assistant Professor of Medical Psychology in Department
of Psychiatry and Lecturer in Psychology* 2745 Montgomery Street
- Herbert Crovitz (1963), Ph.D. (Duke)
*Associate Professor of Medical Psychology in the
Department of Psychiatry and Lecturer in Psychology* 2745 Montgomery Street
- Alvin L. Crumbliss (1970), Ph.D. (Northwestern)
Assistant Professor of Chemistry 13A Colonial Apartments
- William L. Culberson (1955), Ph.D. (Wisconsin)
Professor of Botany Route 7
George King Road
- ⁵⁵Glenn R. Cunningham (1970), M.D. (Oklahoma)
Associate in Medicine 2612 Sara Avenue
- William D. Currie (1967), Ph.D. (North Carolina)
Assistant Professor of Radiology 3611 Randolph Road

⁵²Through 8-31-71.

⁵³Sabbatical leave, spring 1971-72.

^{53a}Through 6-30-71.

⁵⁴Sabbatical leave 1971-72.

⁵⁵Through 6-30-71.

- ⁵⁶Robert Earl Cushman (1945), B.D., Ph.D. (Yale)
Research Professor of Systematic Theology 2719 Spencer Street
 Ronald Y. Cusson (1970), Ph.D. (California Institute of Technology) Apartment 5-F
Associate Professor of Physics 311 S. LaSalle Street
 Jarir S. Dajani (1971), Ph.D. (Northwestern) Apartment 20-D
Assistant Professor of Civil Engineering 2748 Middleton
 John T. Daly (1971), M.D. (Cornell)
Associate in Pathology 2901 Shannon Road
 William W. Damon (1970), Ph.D. (Cornell)
Assistant Professor of Business Administration 5600 Woodberry Road
 Jerry Lee Danford (1971), M.D. (Duke)
Associate in Obstetrics and Gynecology 911 West Murray Avenue
 Charles A. Daniels (1970), M.D. (Vanderbilt)
Lecturer in Pathology 4 Sylvan Road
⁵⁷Thaddeus George Dankel, Jr. (1968), M.A. (Princeton) Apartment 11-B
Assistant Professor of Mathematics 1700 Chapel Hill Road
 Ollie B. Davenport (1961), M.S.N. (Western Reserve)
Assistant Professor of Nursing 905 West Knox Street
 Rose Marie Davidites (1971), M.A. (New York) 58 Middagh Street
Visiting Assistant Professor of Nursing Brooklyn, N. Y.
 Jack Dougan Davidson (1970), M.D. (Columbia)
Associate Professor of Radiology 3506 Westover Road
 David George Davies (1961), Ph.D. (California)
Professor of Economics 2631 McDowell Street
 William David Davies (1966), D.D. (Wales)
*George Washington Ivey Professor of Advanced Studies
 in New Testament and Research in Christian Origins* 228 Monticello Road
 Calvin D. Davis (1962), Ph.D. (Indiana)
Associate Professor of History 907 Monmouth Avenue
 David A. Davis (1971), M.D. (Vanderbilt) Kings Mill Road
Professor of Anesthesiology Chapel Hill, N. C.
 Gifford Davis (1930), Ph.D. (Harvard)
Professor of Romance Languages 2248 Cranford Road
 Lucy T. Davis (1969), Ed.D. (Columbia)
*Assistant Professor of Education and Clinical Associate in
 Therapeutic Education in the Department of Psychiatry* 223 Hillcrest Circle
 Chapel Hill, N. C.
⁵⁸Otho L. Davis (1965), M.A. (Kent State)
Assistant Professor of Physical Education and Trainer 214 Lansbury Street
 Ron W. Davis (1970), Ed.D. (Columbia) 223 Hillcrest Circle
Associate in Community Health Sciences Chapel Hill, N. C.
 Eugene Davis Day (1962), Ph.D. (Delaware)
*Professor of Immunology and
 Professor of Experimental Surgery* 2727 McDowell Street
 John Essary Dees (1939), M.D. (Virginia) 413 Carolina Circle
Professor of Urology
 Susan Coons Dees (1939), M.D. (Johns Hopkins) 413 Carolina Circle
Professor of Pediatrics
⁵⁹Selma de la Queriére (1971), M.A. (New York Univ.) 8-A Towne House Apartments
Temporary Instructor in Romance Languages Chapel Hill, N. C.
 Harry K. Delcher (1971), M.D. (Florida)
Associate in Medicine 101 Newell Street
 David C. Dellinger (1968), Ph.D. (Stanford)
Associate Professor of Business Administration 19 Heath Place

⁵⁶Sabbatical leave 1971-72.

⁵⁷Through 8-31-71.

⁵⁸Through 8-31-71.

⁵⁹Through 12-31-71.

- Walter E. Dellinger, III (1969), LL.B. (Yale)
Associate Professor of Law 4339 Berini Drive
- Frank De Lucia (1969), Ph.D. (Duke)
Assistant Professor of Physics 1618 North Duke Street
- Neil B. deMarchi (1971), Ph.D. (Australian National Univ., Canberra)
Assistant Professor of Economics 2902 Gretmar Drive
- William J. A. DeMaria (1951), M.D. (Duke)
Professor of Pediatrics and Professor of Community Health Sciences 1126 Woodburn Road
- A. Leigh DeNeef (1969), Ph.D. (Pennsylvania State)
Assistant Professor of English 12 Ashley Road
- Betsy J. Denny (1971), B.S. (North Carolina)
Associate in Physical Therapy 5201 Peppercorn
- Sara Jamison Dent (1965), M.D. (South Carolina)
Professor of Anesthesiology Route 1, Box 30
Hillsborough, N. C.
- Gretchen J. Dery (1969), M.S. (Catholic Univ.)
Assistant Professor of Nursing 12-H Valley Terrace Apartments
- Justin Thomas DeVoge (1970), Ph.D. (West Virginia)
Associate in Medical Psychology in the Department of Psychiatry and Lecturer in Psychology 80-C Colonial Apartments
- ⁶⁰Frank Traver deVyver (1935), Ph.D. (Princeton)
Professor of Economics 8 Sylvan Road
- Irving Diamond (1958), Ph.D. (Chicago)
James B. Duke Professor of Psychology and Professor of Physiology 2745 McDowell Street
- Joseph Di Bona (1967), Ph.D. (California)
Associate Professor of Education 1123 Woodburn Road
- Luca Di Cecco (1966), M.M. (Indiana)
Assistant Professor of Music 5418 Beaumont Drive
- Robert L. Dickens (1949), M.S. (North Carolina), C.P.A., LL.D.
Professor of Accounting in the Department of Management Sciences 2717 Circle Drive
- Alice E. Dietz (1970), M.P.H. (North Carolina at Chapel Hill)
Assistant Professor of Nursing and Associate in Community Health Sciences 310 Burlage Circle
Chapel Hill, N. C.
- ⁶¹Marcus L. Dillon (1957), M.D. (Duke)
Associate Professor of Surgery 1005 Minerva Avenue
- Arif Dirlik (1971), B.S. (Robert Coll. Istanbul, Turkey)
Instructor in History 104 Bennett Court
- Bruce W. Dixon (1970), M.D. (Pittsburgh)
Assistant Professor of Medicine 2D Anderson Street Apartments
- ⁶²John W. Dixon (1971), Ph.D. (Chicago)
Visiting Professor of Religion 216 Glenhill Lane
Chapel Hill, N. C.
- Frank C. Dorsey (1971), Ph.D. (Duke)
Assistant Professor of Pathology 204 Forestwood Drive
- ⁶³Neal Dow (1934), Ph.D. (Pennsylvania)
Professor of Romance Languages 2252 Cranford Road
- ⁶⁴Robert Dowda (1971), B.D. (Duke)
Graduate Assistant in New Testament 854-B Louise Circle
- ⁶⁵Anthony R. Dowell (1969), M.D. (Indiana)
Assistant Professor of Medicine 2823 Ridge Road

⁶⁰Sabbatical leave, spring 1971-72.

⁶¹Through 9-30-71.

⁶²Through 5-31-71.

⁶³Retired 8-31-71.

⁶⁴Through 5-31-71.

⁶⁵Through 6-11-71.

- ⁶⁶Roger W. Doyle (1967), Ph.D. (Yale)
Assistant Professor of Zoology Apartment 4
 914 Monmouth Avenue
- Francis George Dressel (1929), Ph.D. (Duke)
Professor of Mathematics 2502 Francis Street
- Chancellor Driscoll (1969), M.S.S.W. (Louisville)
Associate in Psychiatric Social Work Apartment 7
 2007 House Avenue
- Bernard I. Duffey (1963), Ph.D. (Ohio State)
Professor of English 2732 Dogwood Drive
- Kenneth Lindsay Duke (1940), Ph.D. (Duke)
Associate Professor of Anatomy 2736 McDowell Street
- ⁶⁷Charles Dunlop (1970), M.A. (Duke)
Instructor in Philosophy 1002 Camden Avenue
- Robert F. Durden (1952), Ph.D. (Princeton)
Professor of History 2532 Wrightwood Avenue
- Jiri Dvorak (1967), Ph.D. (Brown)
Associate Professor of Civil Engineering 2956 Friendship Drive
- D. S. Dwivedi (1971), Ph.D. (Agra Univ., India)
Visiting Lecturer in Hindi-Urdu Apartment L-1B
 1500 Duke University Road
- Thomas G. Dzubay (1969), Ph.D. (Minnesota)
Assistant Professor of Physics 2410 Huron Circle
- ⁶⁸Paul H. Earls (1959), Ph.D. (Rochester)
Associate Professor of Music 1509 Hollywood Street
- ⁶⁹Paul A. Ebert (1966), M.D. (Ohio State)
Associate Professor of Surgery 4004 Bristol Road
- Elaine M. Eckel (1971), B.S. (Pennsylvania)
Associate in Physical Therapy 26-B Davie Circle
 Chapel Hill, N. C.
- ⁷⁰Ruth Buchanan Eddy (1952), M.S. (Smith)
Associate Professor of Physical Education 702 Louise Circle
- James Michael Efrid (1962), Ph.D. (Duke)
Associate Professor of Biblical Languages and Interpretation Apartment L-1
 2800 Croasdaile Drive
- ⁷¹Arthur A. Eggert (1970), Ph.D. (Wisconsin)
Visiting Assistant Professor of Chemistry 26D Colonial Apartments
- Carl Eisdorfer (1958), Ph.D. (New York)
Professor of Medical Psychology and Professor of Psychiatry 311 South LaSalle Street
- William B. Eisenhardt (1970), B.S. (U. S. Naval Academy)
Visiting Assistant Professor of Naval Science 2414 Sparwood Drive
- Jane G. Elchlepp (1960), M.D. (Iowa), Ph.D. (Chicago)
Associate Professor of Pathology Route 1
 Cornwallis Road
- Albert F. Eldridge (1970), Ph.D. (Kentucky)
Assistant Professor of Political Science Apartment 2A
 Seven Oaks Road
- Howard L. Elford (1969), Ph.D. (Cornell)
Assistant Professor of Experimental Medicine and Assistant Professor of Pharmacology Apartment 14
 18 Balmoray Court
- Merrill Francis Elias (1971), Ph.D. (Purdue)
Assistant Professor of Medical Psychology in the Department of Psychiatry Apartment A
 1901 James Street
- Everett H. Ellinwood, Jr. (1966), M.D. (North Carolina)
Associate Professor of Psychiatry and Assistant Professor of Pharmacology 3519 Tonbridge Way

⁶⁶Through 8-31-71.

⁶⁷Through 8-31-71.

⁶⁸Sabbatical leave 1971-72.

⁶⁹Through 2-1-71.

⁷⁰Sabbatical leave, spring 1971-72.

⁷¹Through 8-31-71.

- George John Ellis, III (1970), M.D. (Harvard)
Assistant Professor of Medicine 2743 Sevier Street
- Ernest Elsevier (1950), M.S.M.E. (Georgia Institute of Technology)
Associate Professor of Mechanical Engineering 2412 Wrightwood Avenue
- Ainslie T. Embree (1969), Ph.D. (Columbia)
Professor of History 3408 Dover Road
- Carl Erickson (1966), Ph.D. (Rutgers)
Associate Professor of Psychology 106 Newell Street
- Harold P. Erickson (1970), Ph.D. (Johns Hopkins)
Assistant Professor of Anatomy 1108 Minerva Avenue
- Robert P. Erickson (1961), Ph.D. (Brown)
Associate Professor of Psychology 3415 Hope Valley Road
- Charles W. Erwin (1969), M.D. (Texas)
Associate Professor of Psychiatry 15 Scott Place
- Antonio Valentino Escueta (1970), M.D. (Univ. of St. Thomas, Philippines)
Assistant Professor of Neurology 1601 Kent Street
- E. Harvey Estes, Jr. (1953), M.D. (Emory)
*Professor of Medicine and Professor of
 Community Health Sciences* 3542 Hamstead Court
- John C. Evans (1967), M.D. (Michigan)
Professor of Radiology 2 Oxford Apartments
 Chapel Hill, N. C.
- Lawrence E. Evans (1963), Ph.D. (Johns Hopkins)
Associate Professor of Physics 1020 Demerius Street
- John Wendell Everett (1932), Ph.D. (Yale)
Professor of Anatomy 1105 Woodburn Road
- Robinson Oscar Everett (1956), LL.M. (Duke)
Professor of Law 600-13A LaSalle Street
 Apartment 9
- ⁷²Katherine C. Ewel (1969), Ph.D. (Florida)
Temporary Instructor in Zoology 5222 Kerley Road
- Henry A. Fairbank (1962), Ph.D. (Yale)
Professor of Physics 1515 Pinecrest Road
- Carmen M. Falcone (1946), M.A. (Ohio State)
Professor of Physical Education 1402 Woodburn Road
- ⁷³Ronald E. Falls (1970), M.D. (Louisville)
Associate in Radiology 505 Sharon Road
 Chapel Hill, N. C.
- W. Edwin Fann (1971), M.D. (Alabama)
Assistant Professor of Psychiatry 3726 Saint Marks Road
- Joseph C. Farmer, Jr. (1971), M.D. (Duke)
Assistant Professor of Otolaryngology 1507 Southwood Drive
- Donn Michael Farris (1959), M.S. in L.S. (Columbia)
Professor of Theological Bibliography 921 Buchanan Boulevard
- ⁷⁴Ben W. Feather (1963), Ph.D. (Duke)
*Associate Professor of Psychiatry and Lecturer in
 Psychology* 3300 East Oak Street
- ⁷⁵Roberta Feather (1965), M.S.N.E. (North Carolina)
Assistant Professor of Nursing 3300 East Oak Street
- Robert A. Federchuck (1969), A.B. (Syracuse)
Associate in Physical Therapy 2209 Elmwood Avenue
- ⁷⁶John Morton Fein (1950), Ph.D. (Harvard)
Professor of Romance Languages 2726 Montgomery Street

⁷²Through 5-31-71.

⁷³Through 1-31-71.

⁷⁴Through 6-30-71.

⁷⁵Through 8-31-71.

⁷⁶Sabbatical leave, 1971-72.

- Jerome Feldman (1968), M.D. (Northwestern)
Assistant Professor of Medicine 2744 Sevier Street
- Robert E. Fellows (1966), M.D. (McGill), Ph.D. (Duke)
Associate Professor of Physiology and Assistant Professor of Medicine 3106 Ridge Road
- ⁷⁷Arthur Bowles Ferguson (1939), Ph.D. (Cornell)
Professor of History 22 Lebanon Circle
- Oliver W. Ferguson (1957), Ph.D. (Illinois)
Professor of English 1212 Arnette Avenue
- Bernard F. Fetter (1951), M.D. (Duke)
Professor of Pathology 3836 Somerset Drive
- Peter G. Fish (1969), Ph.D. (Johns Hopkins)
Associate Professor of Political Science 1006 Urban Avenue
- Joel L. Fleishman (1971), LL.M. (Yale)
Associate Professor of Law 205 Wood Circle
 Chapel Hill, N. C.
- Maxine Rogers Flowers (1971), M.S. (Columbia)
Associate in Psychiatric Social Work Willow Terrace Apartment 54
 Chapel Hill, N. C.
- Walter L. Floyd (1959), M.D. (Johns Hopkins)
Associate Professor of Medicine 3556 Hamstead Court
- Donald J. Fluke (1958), Ph.D. (Yale)
Professor of Zoology 2703 Sevier Street
- Lloyd R. Fortney (1964), Ph.D. (Wisconsin)
Associate Professor of Physics 2 Scott Place
- Ellen Gwendolyn Fortune (1964), M.A. (Western Reserve)
Professor of Nursing 5203 Shady Bluff Road
- Richard Forward (1971), Ph.D. (California at Santa Barbara)
Assistant Professor of Zoology 1510 Front Street
 Beaufort, N. C.
- Ludmila A. Foster (1970), Ph.D. (Harvard)
Assistant Professor of Slavic Languages Apartment 19-D
 2748 Middleton
- Donald R. Fowler (1967), M.D. (Southwestern Medical School of Texas)
Assistant Professor of Psychiatry Route 2, Box 19
- ⁷⁸Earle Cabell Fowler (1962), Ph.D. (Harvard)
Professor of Physics 1821 Lake Shore Drive
 Chapel Hill, N. C.
- John Alvis Fowler (1953), M.D. (Bowman Gray)
Professor of Psychiatry and Assistant Professor of Pediatrics 2721 Spencer Street
- Wallace Fowlie (1964), Ph.D. (Harvard)
James B. Duke Professor of Romance Languages 17-D Valley Terrace Apartments
- ⁷⁹Richard G. Fox (1968), Ph.D. (Michigan)
Associate Professor of Anthropology 124 West Queen Street
 Hillsborough, N. C.
- Charles H. Frenzel (1956), B.A. (Duke)
Professor of Hospital Administration 3950 Bristol Road
- Irwin Fridovich (1958), Ph.D. (Duke)
Professor of Biochemistry 3517 Courtland Drive
- Robert O. Friedel (1970), M.D. (Duke)
Assistant Professor of Psychiatry and Assistant Professor of Pharmacology 1614 Pinecrest Road
- John A. Friedrich (1963), Ph.D. (Michigan State)
Professor of Physical Education 2953 Welcome Drive
- ⁸⁰Donald L. Fry (1971), M.D. (Harvard)
Visiting Professor of Physiology 5512 Lincoln Street
 Bethesda, Md.
- William J. Furbish (1954), M.S. (Wisconsin)
Associate Professor of Geology Route 2
 Hillsborough, N. C.

⁷⁷Sabbatical leave 1971-72.

⁷⁸Through 2-28-71.

⁷⁹Leave of absence 1971-72.

⁸⁰Through 6-30-72.

- Mercedes Gaffron (1958), Ph.D. (Berlin), M.D. (Munich)
Associate Research Professor of Psychology 1612 Maryland Avenue
- Johnnie L. Gallemore, Jr. (1969), M.D. (Emory)
Assistant Professor of Psychiatry 2945 Friendship Road
- Thomas Muir Gallie, Jr. (1964), Ph.D. (Rice)
Professor of Computer Science 2740 Montgomery Street
- John T. Garbutt (1969), M.D. (Temple)
Assistant Professor of Medicine 3836 Churchill Circle
- ⁸¹Sutter A. Gardanier, II (1970), M.D. (Colorado)
Assistant Professor of Pathology 49-D Colonial Apartments
Box 74
- Cebrun A. Gaustad (1970), Ph.D. (North Carolina at Chapel Hill)
Associate in Medical Psychology Butner, N. C.
- Raymond Gavins (1970), Ph.D. (Virginia)
Assistant Professor of History 2227 Emerson Place
- ⁸²Ila H. Gehman (1959), Ed.D. (Pennsylvania State)
Associate Professor of Medical Psychology in Department
of Psychiatry and Lecturer in Psychology 2703 Spencer Street
- ⁸³W. Scott Gehman, Jr. (1954), Ph.D. (Pennsylvania State)
Professor of Psychology in Education 2703 Spencer Street
- John A. Gehweiler (1967), M.D. (Duke)
Assistant Professor in Radiology 3551 Hamstead Court
- Janet Gay Gelein (1970), M.S. (Duke)
Instructor of Nursing Route 7, Box 269A
- ⁸⁴Ernest A. E. Gellhorn (1966), LL.B. (Minnesota)
Professor of Law 2717 Wrightwood Avenue
- W. Doyle Gentry (1969), Ph.D. (Florida State)
Assistant Professor of Medical Psychology in the
Department of Psychiatry and Lecturer in Psychology 212 Brooklane Drive
- ⁸⁵J. Mason Gentzler (1970), Ph.D. (Columbia)
Visiting Assistant Professor of History 2716 Circle Drive
- Rhett Truesdale George, Jr. (1957), Ph.D. (Florida)
Assistant Professor of Electrical Engineering 3803 Tremont Drive
- Nicholas G. Georgiade (1951), D.D.S., M.D. (Duke)
Professor of Plastic Maxillofacial and Oral Surgery 2523 Wrightwood Avenue
- Gerald E. Gerber (1962), Ph.D. (Northwestern)
Associate Professor of English 2602 Francis Street
- John A. Gergen (1971), M.D. (Harvard)
Assistant Professor of Psychiatry 2416 Alpine Road
Route 1, Box 200
- ⁸⁶Barbara B. Germino (1965), B.S.N. (Duke)
Assistant Professor of Nursing Murphy School Road
- Daniel T. Gianturco (1966), M.D. (Buffalo)
Associate Professor of Psychiatry and Assistant
Professor of Community Health Sciences 2925 Friendship Road
- ⁸⁷Michelle Marguerite Gilles-Baillien (1970), Ph.D. (Univ. of Liege)
Visiting Assistant Professor of Physiology and Pharmacology 123 Front Street
Beaufort, N. C.
- ⁸⁸Ramon Joseph Gilles (1970), Ph.D. (Univ. of Liege)
Visiting Assistant Professor of Physiology and Pharmacology 123 Front Street
Beaufort, N. C.
- Hal G. Gillespie (1971), (Med. Coll. of South Carolina)
Associate in Psychiatry Highland Hospital
Asheville, N. C.

⁸¹Through 7-15-71.

⁸²Sabbatical leave, fall 1971-72.

⁸³Sabbatical leave, fall 1971-72.

⁸⁴Through 8-31-71.

⁸⁵Through 5-31-71.

⁸⁶Through 8-31-71.

⁸⁷Through 9-30-71.

⁸⁸Through 9-30-71.

- Richard E. Gillespie (1971), B.D. (San Francisco Theological Seminary) Apartment K-4
Instructor in Divinity 2800 Croasdaile Drive
- Nicholas W. Gillham (1968), Ph.D. (Harvard)
Associate Professor of Zoology 1211 Woodburn Road
- ⁸⁹Fred L. Ginn (1968), M.D. (Duke)
Assistant Professor of Pathology 2602 Broad Street
- John D. Giragos (1968), M.D. (American Univ. Medical School, Beirut, Lebanon)
Assistant Professor of Psychiatry 2803 Friendship Road
- Balthasar Gisin (1969), Ph.D. (University of Basel)
Assistant Professor of Physiology The Rockefeller University
 New York, N. Y.
- Sherwood Githens, Jr. (1962), Ph.D. (North Carolina)
Professor of Education 4427 Chapel Hill Road
- James F. Glenn (1963), M.D. (Duke)
Professor of Urology 27 Oak Drive
- ⁹⁰Ronald G. Goebel (1970), M.D. (Louisville)
Associate in Radiology 1547 Fountain Ridge Road
 Chapel Hill, N. C.
- ⁹¹Clarence Gohdes (1930), Ph.D. (Columbia)
James B. Duke Professor of English 2737 Circle Drive
- Joseph Leonard Goldner (1950), M.D. (Nebraska)
Professor of Orthopaedic Surgery 602 East Forest Hills Boulevard
- Leonard J. Goldwater (1968), M.D. (New York)
Professor of Community Health Sciences Route 3, Box 50
 Chapel Hill, N. C.
- Richard A. Goodling (1959), Ph.D. (Pennsylvania State)
Professor of Pastoral Psychology Route 7, Box 308
 Farrington Road
- Jack K. Goodrich (1965), M.D. (Tennessee)
Professor of Radiology 2040 Welcome Drive
- ⁹²Craufurd D. Goodwin (1962), Ph.D. (Duke)
Professor of Economics 2256 Cranford Road
- Walter Gordy (1946), Ph.D. (North Carolina), LL.D.
James B. Duke Professor of Physics 2521 Perkins Road
- John A. Goree (1959), M.D. (Duke)
Associate Professor of Radiology Route 7, Box 223A
- ⁹³Ralph J. Gorten (1963), M.D. (Pennsylvania)
*Assistant Professor of Medicine and Assistant Professor
 of Radiology* 2436 Tryon Road
- Daniel A. Graham (1969), Ph.D. (Duke)
Assistant Professor of Economics 5314 Shady Bluff
- Doyle G. Graham (1970), Ph.D. (Duke)
Assistant Professor of Pathology 1702 Glendale Avenue
- ⁹⁴Thomas P. Graham, Jr. (1969), M.D. (Duke)
Assistant Professor of Pediatrics 3413 Rolling Hill Road
- ⁹⁵Elizabeth W. Grant (1971), Ph.D. (Harvard)
Temporary Instructor in Romance Languages 2509 Wrightwood Avenue
- ⁹⁶Richard Babson Grant (1952), Ph.D. (Harvard)
Professor of Romance Languages 2509 Wrightwood Avenue
- Pauline Gratz (1969), Ed.D. (Columbia)
Professor of Human Ecology in Nursing 220 Dacian Avenue
- James Clifford Green (1971), M.D. (Illinois)
Associate in Psychiatry 32 Robinhood Road
 Asheville, N. C.

⁸⁹Through 3-1-71.

⁹⁰Through 1-31-71.

⁹¹Retired 8-31-71.

⁹²Leave of absence 2-1-71 through 8-31-72.

⁹³Through 6-27-71.

⁹⁴Through 6-30-71.

⁹⁵Through 12-31-71.

⁹⁶Through 8-31-71.

- James Davis Green (1970), M.D. (Tulane)
Assistant Professor of Radiology 2511 Sevier Street
- Robert Lee Green, Jr. (1960), M.D. (Hahnemann)
Associate Professor of Psychiatry 3700 Hermine Street
- Ronald C. Greene (1958), Ph.D. (California Institute of Technology)
Associate Professor of Biochemistry 1014 Norwood Avenue
- Joseph C. Greenfield (1962), M.D. (Emory)
Professor of Medicine and Assistant Professor of Physiology 1212 Virginia Avenue
- John R. Gregg (1957), Ph.D. (Princeton)
Professor of Zoology 3702 Randolph Road
- ⁹⁷Robert A. Gregg (1961), M.D. (South Carolina)
*Associate Professor of Physical Medicine and Associate
 Professor of Community Health Sciences* 2747 Sevier Street
- Eugene Grueling (1948), Ph.D. (Indiana)
Professor of Physics 2414 Perkins Road
- John Francis Griffith (1969), M.D. (Saskatchewan Univ.)
*Associate Professor of Pediatrics and Assistant
 Professor of Medicine* 1415 North Gregson Street
- John H. Grimes (1970), M.D. (Northwestern)
Assistant Professor of Urology 3524 Sayward Drive
- Keith Sanford Grimson (1930-42; 1945), M.D. (Rush)
Professor of Surgery 3313 Devon Road
- David L. Grode (1971), M.D. (Duke)
Associate in Radiology Apartment 14
 2132 Bedford Street
- Samson R. Gross (1960), Ph.D. (Columbia)
Professor of Genetics and Biochemistry 2411 Prince Street
- Herman Grossman (1971), M.D. (Columbia)
*Associate Professor of Radiology and Associate
 Professor of Pediatrics* Apartment 7
 2330 Hilton Avenue
- Kazimierz Grzybowski (1967), S.J.D. (Harvard)
*Professor of Political Science and Part-time
 Professor in the Law School* 2605 University Drive
- Walter R. Guild (1960), Ph.D. (Yale)
Professor of Biophysics 2625 McDowell Street
- Robert B. Gunn (1971), M.D. (Harvard)
Assistant Professor of Physiology and Pharmacology 3408 Cromwell Road
- J. Caulie Gunnells (1962), M.D. (South Carolina)
Associate Professor of Medicine 3317 Devon Road
- John Gutknecht (1969), Ph.D. (North Carolina)
Assistant Professor of Physiology 2506 Nation Avenue
- William F. Gutknecht (1971), Ph.D. (Purdue Univ.)
Assistant Professor of Chemistry Apartment 83B
 3022 Chapel Hill Road
- Robert A. Gutman (1971), M.D. (Florida)
Assistant Professor of Medicine 2403 Wrightwood Avenue
- Norman Guttman (1951), Ph.D. (Indiana)
Professor of Psychology 201 Woodridge Drive
- Robert L. Habig (1969), Ph.D. (Purdue)
Assistant Professor of Clinical Biochemistry 514 Marshall Way
- Donald B. Hackel (1960), M.D. (Harvard)
Professor of Pathology 4018 Bristol Road
- ⁹⁸Herbert Hacker, Jr. (1965), Ph.D. (Michigan)
Associate Professor of Electrical Engineering 2739 Montgomery Street
- Charles B. Hagan (1971), Ph.D. (Duke)
Visiting Professor of Political Science Apartment 16
 2330 Hilton

⁹⁷Through 6-30-71.

⁹⁸Sabbatical leave 1971-72.

- Robert D. Hagan (1970), B.A. (Missouri)
Visiting Assistant Professor of Naval Science 916 Carpenter-Fletcher Road
- Per-Otto F. Hagen (1970), F.H.W.C. (Watt, Edinburgh, Scotland) Apartment 18
Assistant Professor of Experimental Surgery 1920 Bedford Street
- Robert L. Hagerman (1971), M.B.A. (Rochester)
Instructor in Management Sciences Apartment 8-K
 311 South LaSalle Street
- Ellis P. Hagler (1936)
Instructor in Physical Education 1715 Cornwallis Road
- Thomas M. Haizlip (1970), M.D. (North Carolina)
Assistant Professor of Psychiatry 5201 Rembert Drive
 Raleigh, N. C.
- ⁹⁹David R. Halbert (1971), M.D. (Pennsylvania)
Associate in Obstetrics and Gynecology 305 Yorktown Drive
 Chapel Hill, N. C.
- Dwight Hubert Hall (1968), Ph.D. (Purdue)
Assistant Professor of Biochemistry 3816 Hillgrand Drive
- Hugh Marshall Hall (1952), Ph.D. (Texas)
Professor of Political Science 613 Swift Avenue
- Kenneth D. Hall (1958), M.D. (Duke)
Professor of Anesthesiology 2715 Montgomery Street
- ¹⁰⁰Louise Hall (1931), Ph.D. (Radcliffe)
Professor of Architecture Box 6636
 College Station
- Thor Hall (1962), B.D., Ph.D. (Duke)
Associate Professor of Preaching and Theology 3537 Hamstead Court
- William C. Hall (1970), Ph.D. (Duke)
Assistant Professor of Anatomy and
Assistant Professor of Psychology 1506 Southwood Drive
- John Hamilton Hallowell (1942), Ph.D. (Princeton), Litt.D.
Professor of Political Science 3606 Darwin Road
- Gerald Myron Halprin (1970), M.D. (Wayne State)
Associate in Medicine 227 Seven Oaks Road
- ¹⁰¹Iain Hamilton (1962), B.M. (London)
Mary Duke Biddle Professor of Music 202 Erwin Apartments
- John D. Hamilton (1971), M.D. (Colorado)
Associate in the Department of Medicine 3300 East Oak Drive
- Michael Hamilton (1971), M.P.H. (North Carolina)
Associate in Community Health Sciences 105 Old Oxford Road
 Chapel Hill, N. C.
- William Baskerville Hamilton (1936), Ph.D. (Duke)
Professor of History 300 Swift Avenue
 Alastair Court Apartments
- Charles B. Hammond (1968), M.D. (Duke)
Assistant Professor in Obstetrics and Gynecology 3521 Mossdale Avenue
- William E. Hammond (1968), Ph.D. (Duke)
Associate Professor of Community Health Sciences and
Assistant Professor of Biomedical Engineering 10 Forrestdale Drive
- Moo Young Han (1967), Ph.D. (Rochester)
Associate Professor of Physics Apartment E-2
 1200 Leon Street
- ¹⁰²Philip Handler (1939), Ph.D. (Illinois)
James B. Duke Professor of Biochemistry and Nutrition 2529 Perkins Road
- Stuart Handwerker (1971), M.D. (Maryland)
Assistant Professor of Pediatrics 2951 Friendship Road
- John Kennedy Hanks (1954), M.A. (Columbia)
Professor of Music and Lecturer in Church Music 1810 Glendale Avenue
- Frank Allan Hanna (1948), Ph.D. (Wisconsin)
Professor of Economics 2239 Cranford Road

⁹⁹Military leave, 6-1-71 through 5-31-73.

¹⁰⁰Sabbatical leave, fall 1971-72.

¹⁰¹Leave of absence 1971-72.

¹⁰²Leave of absence 7-1-69 through 6-30-74.

- Elizabeth B. Harkins (1968), M.S.W. (Pittsburgh)
Associate in Psychiatry 6 Buena Vista Road
Asheville, N. C.
- ¹⁰³Thomas S. Harle (1969), M.D. (Northwestern)
Associate Professor of Radiology 2511 Sevier Street
- Charles M. Harman (1961), Ph.D. (Wisconsin)
Professor of Mechanical Engineering 2620 McDowell Street
- Merel H. Harmel (1971), M.D. (Johns Hopkins)
Professor of Anesthesiology Apartment 20
2117 Bedford Street
- Ellwood Scott Harrar (1936) Ph.D. (Syracuse), Sc.D.
James B. Duke Professor of Wood Science 2228 Cranford Road
- Philip D. Harriman (1968), Ph.D. (California at Berkeley)
Assistant Professor of Biochemistry 2713 Stuart Drive
- Betty Glenn Harris (1970), M.S.N. (Alabama)
Assistant Professor of Nursing 6516 Brookhollow Drive
Raleigh, N. C.
- Cecil Craig Harris (1967), M.S. (Tennessee)
Assistant Professor of Medical Electronics 2910 Welcome Drive
- Harold Joseph Harris (1960), M.D. (Long Island College of Medicine)
Associate Professor of Psychiatry and
Assistant Professor of Pediatrics 1702 N. Roxboro Road
- Jerome Sylvan Harris (1936), M.D. (Harvard)
J. Buren Sidbury Professor of Pediatrics
and Associate Professor of Biochemistry 2907 Hope Valley Road
- Robert B. Hartford (1968), Ph.D. (Cornell)
Assistant Professor of Sociology 2729 Circle Drive
- ^{103a}Lodwick Hartley (1971), Ph.D. (Princeton)
Visiting Professor of English 812 Fairall Drive
Raleigh, N. C.
- Gerald W. Hartwig (1970), Ph.D. (Indiana)
Assistant Professor of History 3324 Rolling Hill Road
- ¹⁰⁴Ingrid U. Hartwig (1969), B.A. (Wirtschaftschule, Germany)
Temporary Instructor in German 505 Brighton Street
- William John Harvey (1961), B.S. (Appalachian)
Assistant Professor of Physical Education Route 2, Russell Road
- George Corbin Harwell (1935), Ph.D. (Duke)
Associate Professor of English 2115 Wilson Street
- ¹⁰⁵Paula Hass (1970), M.A. (Duke)
Lecturer in Sociology and Anthropology 857 Louise Circle
- Albert F. Hathaway (1970), M.D. (Hahnemann)
Associate in Community Health Sciences 801 San Souci Drive
Raleigh, N. C.
- Clark C. Havighurst (1964), J.D. (Northwestern)
Professor of Law 3610 Dover Road
- Thomas Havrilesky (1969), Ph.D. (Illinois)
Associate Professor of Economics 1508 Alabama Avenue
- Thomas D. Hayward (1970), Ph.D. (Washington)
Assistant Professor and Research Associate in Physics 5207 Old Hillsboro Road
- William S. Hecksher (1966), Ph.D. (Hamburg)
Benjamin N. Duke Professor of Art P. O. Box 6605
College Station
- ¹⁰⁶Peter L. Hein (1963), M.D. (Georgetown)
Associate Professor of Psychiatry 2511 Perkins Road
- Henry Hellmers (1965), Ph.D. (California)
Professor of Botany and Professor of Forestry 1646 Marion Avenue
- Carl Helvie (1969), Ph.D. (Johns Hopkins)
Associate Professor of Nursing Howard Lane
Route 7, Box 72

¹⁰³Through 6-30-71.

^{103a}Through 5-31-71.

¹⁰⁴Through 5-31-71.

¹⁰⁵Through 8-31-71.

¹⁰⁶Through 6-30-71.

- James Paisley Hendrix (1938), M.D. (Pennsylvania)
Professor of Medicine and Therapeutics 144 Pinecrest Road
- Robert W. Henkens (1968), Ph.D. (Yale)
Assistant Professor of Chemistry 2116 Pershing Street
- James Donald Henry (1960), M.M. (Indiana)
Assistant Professor of Music 311 W. Delafield Street
- Stuart C. Henry (1959), B.D., Ph.D. (Duke)
Professor of American Christianity K-1-A University Apartments
- C. Ward Henson (1967), Ph.D. (Massachusetts Institute of Technology)
Assistant Professor of Mathematics 1702 Vista Street
- S. Duncan Heron, Jr. (1950), Ph.D. (North Carolina)
Professor of Geology Route 1, Box 92
- David G. Herr (1967), Ph.D. (North Carolina)
Assistant Professor of Mathematics 3112 Camelot Street
- ¹⁰⁷Frederick L. Herzog (1960), Ph.D. (Princeton)
Professor of Systematic Theology 2936 Chapel Hill Road
- ¹⁰⁸Julia G. Hester (1965), M.S. (North Carolina)
Assistant Professor of Nursing Apartment 7D
Colonial Apartments
- Siegfried Heyden (1966), M.D. (Berlin)
Associate Professor of Community Health Sciences 1407 Arnette Avenue
- Albert Heyman (1953), M.D. (Maryland)
Professor of Medicine 1216 Woodburn Road
- Jacqueline Hijmans (1965), M.D. (State University, Leyden, Holland)
Assistant Professor of Medicine and Instructor in Physiology 2907 Hope Valley Road
- Gale B. Hill (1967), Ph.D. (Duke)
Associate in Radiology 4300 W. Galax Drive
Raleigh, N. C.
- Robert L. Hill (1961), Ph.D. (Kansas)
Professor of Biochemistry 2510 Perkins Avenue
- Brian Andrew Hills (1968), Ph.D. (Adelaide)
*Associate Professor of Experimental Surgery
and Associate Professor of Biomedical Engineering* 524 Wofford Road
- Frederick R. Hine (1958), M.D. (Yale)
Professor of Psychiatry 2317 Prince Street
- Richard D. Hobbet (1968), J.D. (Iowa)
Professor of Law 2703 Augusta
- Marcus Edwin Hobbs (1935), Ph.D. (Duke)
Professor of Chemistry 115 Pinecrest Road
- Richard Earl Hodel (1965), Ph.D. (Duke)
Associate Professor of Mathematics 52-B Colonial Apartments
- ¹⁰⁹Carol Clark Hogue (1963), M.S.N. (Duke)
Assistant Professor of Nursing 2913 Welcome Drive
- Luther C. Hollandsworth (1970), M.D. (Bowman Gray)
Assistant Professor of Anesthesiology Route 6, Sherwood Forest
Chapel Hill, N. C.
- Irving Brinton Holley, Jr. (1947), Ph.D. (Yale)
Professor of History 2506 Wrightwood Avenue
- Frederic B. M. Hollyday (1956), Ph.D. (Duke)
Professor of History 1824 Forest Road
- Wayne J. Holman, III (1971), Ph.D. (Massachusetts Instit. of Tech.)
Visiting Associate Professor of Physics Apartment H-15
4216 Garrett Road
- ¹¹⁰Everett Harold Hopkins (1961), A.M. (Pennsylvania), LL.D.
Professor of Education 1520 Pinecrest Road
- Grace C. Horton (1969), B.S. (Albright)
Associate in Physical Therapy 8 Greenfield Court

¹⁰⁷Sabbatical leave 1971-72.

¹⁰⁸Through 6-30-71.

¹⁰⁹Leave of absence 9-1-70 through 8-31-72.

¹¹⁰Partial leave of absence extended through academic year, 1971-72.

- Theresa Elizabeth Horton (1964), M.S.N.E. (Pittsburgh)
Associate Professor of Nursing Apartment 3
 810 Clarendon Street
- James S. House (1970), B.A. (Kansas)
Instructor in Sociology and Anthropology Apartment 26J
 200 Seven Oaks Road
- Dennis Robert Howard (1968), M.D. (Wisconsin)
Assistant Professor of Community Health Sciences 5467 Natchez Way
- Andrew T. Huang (1971), M.D. (Med. Coll. of National
 Taiwan Univ.) 219 Wesley Drive
Assistant Professor of Medicine Chapel Hill, N. C.
- ¹¹¹Walter E. Hudgins (1971), Ph.D. (Duke) 204 West Greenway South Drive
Visiting Associate Professor of Religion Greensboro, N. C.
- William R. Hudson (1961), M.D. (Bowman Gray)
Professor of Otolaryngology 504 Compton Place
- ¹¹²Thomas A. Huff (1968), M.D. (Emory)
Associate in Medicine 2504 Vineyard Street
 Robert Edward Huffman (1971), M.D. (Tennessee)
Associate in Psychiatry Highland Hospital
 Asheville, N. C.
- Alexander Hull (1962), Ph.D. (Washington)
Associate Professor of Romance Languages 2318 Prince Street
- Allan S. Hurlburt (1956), Ph.D. (Cornell)
Professor of Education 112 Buchanan Boulevard
- Mary Martin Huse (1959), Ph.D. (Duke)
Assistant Professor of Medical Psychology in Route 7, Box 270
Department of Psychiatry and Lecturer in Psychology Ephesus Church Road
- William L. Hylander (1971), M.A. (Chicago)
Associate in Anatomy 402 Bon Air
- ¹¹³O. Kelly Ingram (1959), B.D. (Duke)
Professor of Parish Ministry 2728 Sevier Street
- Jacquelyne J. Jackson (1968), Ph.D. (Ohio)
Associate Professor of Medical Sociology in the
Department of Psychiatry 2910 Kanewood Drive
- Wallace Jackson (1965), Ph.D. (Pennsylvania)
Associate Professor of English 2705 Stuart Drive
- Ann Madeline Jacobansky (1953), M.Ed. (Pittsburgh)
Professor of Nursing H-8, 1200 Leon Street
- Miriam J. Jacobs (1968), Ph.D. (Alabama)
Professor of Physical Therapy and
Assistant Professor of Anatomy D-14, 1829 Front Street
- M. M. Jarmakani (1969), M.D. (Damascus)
Assistant Professor of Pediatrics and
Associate in Radiology C-3B University Apartments
- Hugo Osvaldo Jauregui (1970), M.D. (Buenos Aires)
Lecturer in Pathology 506 Duluth Street
- Peter Walter Jeffs (1964), Ph.D. (Natal)
Professor of Chemistry 3209 Cromwell Road
- Marianna Duncan Jenkins (1948), Ph.D. (Bryn Mawr)
Associate Professor of Art 1000 North Duke Street
- Alan W. Jenks (1966), Th.D. (Harvard)
Assistant Professor of Religion 2904 Herring Boulevard
- Paul H. Jewett (1969), M.D. (Stanford)
Assistant Professor of Pediatrics 3414 Angus Road
- ¹¹⁴Bronislas de Leval Jezierski (1958), Ph.D. (Harvard)
Associate Professor of Slavic Languages and Literatures 1101 Norwood Avenue

¹¹¹Through 5-31-71.

¹¹²Through 2-1-71.

¹¹³Sabbatical leave 1971-72.

¹¹⁴Sabbatical leave, fall 1971-72.

- John P. Jiminez (1965), M.D. (Med. Coll. of Virginia)
Associate Professor of Radiology 1604 Woodburn Road
- ¹¹⁵Frans F. Jöbsis (1964), Ph.D. (Michigan)
Professor of Physiology 1542 Hermitage Court
- Frederick Charles Joerg (1947), M.B.A. (Harvard)
Professor of Management Sciences and Professor of Forest Management 2424 Wrightwood Avenue
- Sheridan Waite Johns III (1970), Ph.D. (Harvard)
Associate Professor of Political Science 2014 Southwood, 2
- Charles B. Johnson (1956), Ed.D. (Duke)
Associate Professor of Education 2714 McDowell Street
- Charles Johnson (1970), M.D. (Howard)
Assistant Professor of Medicine 1026 Jerome Road
- Dale T. Johnson (1967), Ph.D. (Vanderbilt) 108 Biltmore Garden Apartments
Assistant Professor of Medical Psychology Asheville, N. C.
- Edward Anthony Johnson (1963), M.D. (Sheffield)
Professor of Physiology and Pharmacology 1408 Shepherd Street
- Kurt E. Johnson (1971), Ph.D. (Yale)
Assistant Professor of Anatomy 408 North Hyde Park Avenue
- Raleigh F. Johnson, Jr. (1969), Ph.D. (Purdue)
Associate in Radiology 27-B Colonial Apartments
- Terry Walter Johnson, Jr. (1954), Ph.D. (Michigan)
Professor of Botany 2408 Prince Street
- Irwin Johnsrude (1966), M.D. (Manitoba)
Associate Professor of Radiology 2702 Spencer Street
- William Webb Johnston (1963), M.D. (Luke)
Associate Professor of Pathology 1608 University Drive
- William T. Joines (1966), Ph.D. (Duke)
Associate Professor of Electrical Engineering 4010 Deepwood Circle
- Wolfgang Karl Joklik (1968), Ph.D. (Oxford)
Professor of Microbiology and Immunology 3613 Hathaway Road
- Barney L. Jones (1956), B.D., Ph.D. (Duke)
Associate Professor of Religion 2622 Pickett Road
- Buford Jones (1962), Ph.D. (Harvard)
Associate Professor of English 4116 Neal Road
- Edward Ellsworth Jones (1953), Ph.D. (Harvard)
Professor of Psychology 2738 Sevier Street
- James David Jones (1963), M.D. (Duke)
Assistant Professor of Psychiatry and Assistant Professor of Pediatrics 3851 Somerset Drive
- Rayford Scott Jones (1971), M.D. (Texas)
Associate Professor of Surgery 3903 Regent Road
- Thomas T. Jones (1958), M.D. (Johns Hopkins)
Associate in Community Health Sciences 2621 Stuart Drive
- Vasudev G. Joshi (1971), Ph.D. (Indian Institute of Science)
Associate in Pediatrics Apartment K
1700 Hillcrest Drive
- James Kalat (1971), M.D. (Pennsylvania)
Assistant Professor of Psychology Apartment E6
4216 Garrett Road
- William Arthur Kale (1952), B.D., D.D. (Duke)
Professor of Christian Education 500 East Markham Avenue
- William C. Kalke (1968), M.A. (Princeton)
Assistant Professor of Philosophy 2116 Englewood
- Henry Kamin (1948), Ph.D. (Duke)
Professor of Biochemistry 2417 Perkins Road

¹¹⁵Sabbatical leave 9-1-71 through 5-31-72.

- Edwin L. Kamstock (1971), M.D. (Loyola Univ.)
Associate in Pathology 3823 Lyckan Parkway
- Henry J. Katz (1967), M.A.T. (Duke)
Instructor in Mathematics 1118 Woodburn Road
- Samuel Lawrence Katz (1968), M.D. (Harvard)
Professor of Pediatrics 2212 D Elba Street
- William J. Katzenmeyer (1967), Ed.D. (Duke)
Associate Professor of Education 17-G Duke Manor Apartments
- Bernard Kaufman (1968), Ph.D. (Indiana)
Associate Professor of Biochemistry 2900 Arnold Road
- Charles R. Keith (1963), M.D. (Kansas)
Associate Professor of Psychiatry Route 4, Box 47
 Chapel Hill, N. C.
- Thomas F. Keller (1959), Ph.D. (Michigan)
Professor of Business Administration 1024 West Markham Avenue
- William Nimmons Kelley (1968), M.D. (Emory)
*Associate Professor of Medicine and Assistant
 Professor of Biochemistry* 3500 Donnegale
- Walter Kempner (1934), M.D. (Heidelberg)
Professor of Medicine 1505 Virginia Avenue
- Patrick D. Kenan (1965), M.D. (Duke)
Associate Professor of Otolaryngology 804 Anderson Street
- M. Eugene Kendall (1971), M.D. (Duke)
Associate in Medicine 4008 Hillgrande Drive
- Van Leslie Kenyon, Jr. (1945), M.M.E. (Delaware)
Professor of Mechanical Engineering Route 2
 Hillsborough, N. C.
- Grace Pardridge Kerby (1947), M.D. (Duke)
Professor of Medicine 1108 Wells Street
- ¹¹⁶Alan C. Kerckhoff (1958), Ph.D. (Wisconsin)
Professor of Sociology 1511 Pinecrest Road
- ¹¹⁷Robert B. Kerr (1965), Ph.D. (Johns Hopkins)
Professor of Electrical Engineering 2220 Elmwood Avenue
- Kaye H. Kilburn (1962), M.D. (Utah)
Professor of Medicine and Assistant Professor of Anatomy 3935 Hamstead Court
- Sung-Hou Kim (1970), Ph.D. (Pittsburgh)
Assistant Professor of Biochemistry
- Burton B. King (1967), M.A. (Northwestern)
Associate in Surgery 5105 Peppercorn Street
- Thomas DeArman Kinney (1960), M.D. (Duke)
*R. J. Reynolds Tobacco Company Professor of
 Medical Education and Professor of Pathology* 3120 Devon Road
- Marcel Kinsbourne (1967), M.D. (Oxford)
*Associate Professor of Pediatrics and Neurology
 and Lecturer in Psychology* 2528 Wrightwood Avenue
- Ralph Gary Kirk (1970), Ph.D. (Yale)
Assistant Professor of Physiology 4155 Deepwood Circle
- Warren Kirkendale (1967), Dr.Phil. (Vienna)
Associate Professor of Musicology 2422 Tryon Road
- ¹¹⁸Norman Kirshner (1956), Ph.D. (Pennsylvania State Univ.)
*Professor of Biochemistry and Professor of
 Experimental Surgery* 2524 Wrightwood Avenue
- Paul M. Kirwin (1969), Ph.D. (Texas)
*Associate in Medical Psychology in the Department
 of Psychiatry* 10 Tennyson Place

¹¹⁶Sabbatical leave 1971-72.

¹¹⁷Sabbatical leave 1971-72.

¹¹⁸Sabbatical leave 1971-72.

- Joseph Weston Kitchen, Jr. (1962), Ph.D. (Harvard)
Associate Professor of Mathematics 1600 Delaware Avenue
- Gunter Klabes (1965), B.A. (Freiburg, Germany)
Temporary Instructor in German 801 Underwood Avenue
- ¹¹⁹William J. Klein, Jr. (1969), M.D. (Columbia)
Associate in Medicine 1607 Sycamore Street
- Gordon K. Klintworth (1964), Ph.D. (Witwatersrand, South Africa)
Associate Professor of Pathology 2718 Spencer Street
- Peter H. Klopfer (1958), Ph.D. (Yale)
Professor of Zoology Route 1, Box 293
- Conrad Merton Knight (1961), B.S. (Norwich)
Associate in Radiology and Associate in Community Health Sciences 4603 Blanchard Road
- Kenneth R. Knoerr (1961), Ph.D. (Yale)
Associate Professor of Forest Meteorology in School of Forestry and Associate Professor of Biometeorology in Department of Botany 1608 Woodburn Road
- Lt. Col. Frederick W. Knops, Jr. (1971), M.S. (Rensselaer Polytech Institute)
Professor of Aerospace Studies 7 Tarra Place
- ¹²⁰Delmar H. Knudson (1969), M.D. (Temple)
Associate in Radiology Apartment 56-C
Colonial Apartments
- ¹²¹Erika-Anette Koepfel (1969), M.A. (Seminar Cologne, Germany)
Temporary Instructor in German 410 Tinkerbell Road
Chapel Hill, N. C.
- Yi-Hong Kong (1967), M.D. (National Defense Medical Center, Taipei, Taiwan)
Assistant Professor of Medicine 3822 Hillgrand Drive
- J. Mailen Kootsey (1971), Ph.D. (Brown)
Assistant Professor of Physiology 1610 Sycamore Street
- ¹²²Allen Kornberg (1965), Ph.D. (Michigan)
Professor of Political Science 23 Scott Place
- ¹²³Wesley Kort (1965), Ph.D. (Chicago)
Associate Professor of Religion 3514 Winding Way
- ¹²⁴Helen T. Kotin (1967), M.D. (Colorado)
Associate in Community Health Sciences and Associate in Pediatrics 46 Chicopee Trail
- Phaedon John Koziris (1971), J.D. (Cornell)
Visiting Professor of Law 2220 Elmwood Avenue
- David Kraines (1970), Ph.D. (California at Berkeley)
Assistant Professor of Mathematics 408 Swift Avenue
- Paul Jackson Kramer (1931), Ph.D. (Ohio State)
James B. Duke Professor of Botany 2251 Cranford Drive
- Richard B. Kramer (1968), Ph.D. (Chicago)
Assistant Professor of Psychology 110 Buchanan Boulevard
- ¹²⁵Edward Kready Kraybill (1939), Ph.D. (Michigan)
Associate Professor of Electrical Engineering 2726 Circle Drive
- ¹²⁶Sandra Jo Krebs (1967), M.A. (Middlebury)
Temporary Instructor in German 1102 Monmouth Avenue
- Deborah W. Kredich (1971), M.D. (Michigan)
Associate in Pediatrics 57 Kimberly Drive

¹¹⁹Through 1-25-71.

¹²⁰Through 7-30-71.

¹²¹Through 5-31-71.

¹²²Leave of absence 1971-72.

¹²³Sabbatical leave, spring 1971-72.

¹²⁴Through 6-30-71.

¹²⁵Through 8-31-71.

¹²⁶Through 5-31-71.

- Nicholas M. Kredich (1968), M.D. (Michigan)
Assistant Professor of Medicine and Assistant Professor of Biochemistry 57 Kimberly Drive
- Irwin Kremen (1963), Ph.D. (Harvard)
Assistant Professor of Psychology and Assistant Professor of Medical Psychology in the Department of Psychiatry 216 Forestwood Drive
- William B. Kremer (1966), M.D. (Upstate Medical School, New York)
Assistant Professor of Medicine 2502 Legion Avenue
- Juanita M. Kreps (1955), Ph.D. (Duke)
Professor of Economics 1407 West Pettigrew Street
- William R. Krigbaum (1952), Ph.D. (Illinois), D.Sc.
James B. Duke Professor of Chemistry 2504 Wilson Street
- Robert C. Krueger (1961), D.Phil. (Oxon.)
Associate Professor of English Route 2, Box 484
- Ronald P. Krueger (1969), M.D. (Duke)
Assistant Professor of Pediatrics 3504 Preston
- Arnold D. Krugman (1964), Ph.D. (Kentucky)
Associate Professor of Medical Psychology in the Department of Psychiatry and Lecturer in Psychology 2605 Tanglewood Drive
- Magnus Jan Krynski (1966), Ph.D. (Columbia)
Associate Professor of Slavic Languages and Literatures 1004 West Markham
- Arthur J. Kuhn (1971), Ph.D. (California at Berkeley)
Instructor in Management Sciences 1113 Camden
- W. W. Kulski (1963), LL.D. (Paris)
James B. Duke Professor of Russian Affairs in Department of Political Science 1624 Marion Avenue
- Johannes A. Kylstra (1965), M.D., Ph.D. (Leiden)
Associate Professor of Medicine and Associate Professor of Physiology 2924 Friendship Road
 Route 1
- Weston LaBarre (1946), Ph.D. (Yale)
James B. Duke Professor of Anthropology Mt. Sinai Road
- Leon Lack (1965), Ph.D. (Columbia)
Professor of Pharmacology 1521 Hermitage Court
- Creighton Lacy (1953), B.D., Ph.D. (Yale)
Professor of World Christianity 2714 Dogwood Road
- Martin Lakin (1958), Ph.D. (Chicago)
Professor of Medical Psychology in Department of Psychiatry and Professor of Psychology 2709 McDowell Street
- Celia Lamper (1971), M.S.N. (Duke)
Instructor in Nursing 1816 Guess Road
- Richard Landeira (1970), Ph.D. (Indiana)
Assistant Professor of Romance Languages L-3, 700 Morreene Road
- Maurice B. Landers, III (1969), M.D. (Michigan)
Assistant Professor of Ophthalmology 2965 Friendship Road
- David J. Lang (1968), M.D. (Harvard)
Associate Professor of Pediatrics and Assistant Professor of Virology 1817 Woodburn Road
- David L. Lange (1971), LL.B. (Illinois)
Associate Professor of Law 12-D Towne House Apartments
 Chapel Hill, N. C.
- Karla Langedijk (1969), Ph.D. (Amsterdam)
Lecturer in Art 1110 Wells Street
- Thomas A. Langford (1956), B.D., Ph.D. (Duke)
Professor of Systematic Theology 2002 Dartmouth Drive
- John Tate Lanning (1927), Ph.D. (California)
James B. Duke Professor of History 3007 Surrey Road
- Arthur Larson (1958), D.C.L. (Oxford)
Professor of Law 2030 Bedford Street

- John Laszlo (1960), M.D. (Harvard)
Professor of Medicine Route 1, Box 266
 Cornwallis Road
- Elvin Remus Latty (1937), J.Sc.D. (Columbia)
William R. Perkins Professor of Law 3620 Hathaway Road
- Peter Lauf (1968), M.D. (Freiburg)
*Associate Professor of Physiology and Assistant
 Professor of Immunology* 3535 Hamstead Court
- Bruce B. Lawrence (1971), B.D. (Episcopal Theological School)
Assistant Professor of Religion 2702 Stuart Drive
- Patricia Lawrence (1964), M.A. (Columbia)
Associate in Community Health Sciences 4711 Easley Street
- Richard H. Leach (1955), Ph.D. (Princeton)
Professor of Political Science 1313 Woodburn Road
- John LeBar (1965), M.S. (Kansas State Teachers Coll.)
Instructor in Physical Education 923 Demerius Street
- Harold E. Lebovitz (1962), M.D. (Pittsburgh)
Professor of Medicine and Assistant Professor of Physiology 1847 Woodburn Road
- Jack A. Lees (1971), Ph.D. (Chicago)
Assistant Professor of Mathematics 2216 Elba Street
- John C. LeMay (1961), D.V.M. (Georgia)
Professor of Laboratory Animal Services Route 8, Box 347
 Goodwin Road
- Warren Lerner (1961), Ph.D. (Columbia)
Associate Professor of History 2948 Friendship Road
- Richard G. Lester (1965), M.D. (Columbia)
Professor of Radiology 2703 Montgomery Avenue
- ¹²⁷Edward B. Lewin (1970), M.D. (New York)
Associate in Pediatrics 13 Ashley Road
- David Edmund Lewis (1968), M.A. (Northern Michigan)
Associate in Community Health Sciences R-8 Smallwood Road
- Harold Walter Lewis (1946), Ph.D. (Duke)
Professor of Physics 1708 Woodburn Road
- ¹²⁸Martha Modena Lewis (1933), M.A. (Columbia)
Professor of Physical Education 407 Erwin Apartments
- Melvin Lieberman (1968), Ph.D. (Downstate Medical Center)
Assistant Professor of Physiology and Pharmacology 426 Green Street
- John L. Lievsay (1962), Ph.D. (Univ. of Washington)
James B. Duke Professor of English 2725 Montgomery Street
- ¹²⁹Darwyn E. Linder (1965), Ph.D. (Minnesota)
Associate Professor of Psychology 4029 Nottaway Road
- ¹³⁰L. Sigfred Linderöth (1965), M.S. (Iowa State)
Professor of Mechanical Engineering 2220 Whitley Drive
- Charles Harris Livengood, Jr. (1946), LL.B. (Harvard)
Professor of Law 2804 Chelsea Circle
- Daniel A. Livingstone (1956), Ph.D. (Yale)
Professor of Zoology 2827 Ridge Road
- Charles E. Llewellyn, Jr. (1955), M.D. (Medical College of Virginia)
Associate Professor of Psychiatry 3550 Hamstead Court
- ¹³¹Jane Marie Lloyd (1961), M.A. (North Carolina)
Assistant Professor of Physical Education 704 Louise Circle
- Charles H. Lochmüller (1969), Ph.D. (Fordham)
Assistant Professor of Chemistry 3203 Mossdale Avenue

¹²⁷Termination 6-30-71.

¹²⁸Sabbatical leave, fall 1971-72.

¹²⁹Sabbatical leave 1971-72.

¹³⁰Sabbatical leave, fall 1971-72.

¹³¹Sabbatical leave, spring 1971-72.

- ¹³²Gregory Lockhead (1965), Ph.D. (Johns Hopkins)
Associate Professor of Psychology 101 Emerald Circle
 Gerald L. Logue (1971), M.D. (Pittsburgh)
Associate in Medicine 200 Parthemia Drive
 Christian M. Lohner (1970), M.A. (George Washington)
Visiting Assistant Professor of Aerospace Studies 3315 Powers Lane
¹³³Ernest Croft Long (1956), M.B., B.S., Ph.D. (London)
Professor of Community Health Sciences; Associate
Professor of Physiology and Pharmacology; and Route 7, Box 218
Associate in Pediatrics Erwin Road
 Juanita Lee Long (1970), M.S. (North Carolina)
Instructor of Nursing 1616 Peace Street
 William K. Longley (1968), Ph.D.
Associate Professor of Anatomy 47 Lebanon Circle
 Hans Lowenbach (1940), M.D. (Hamburg)
Professor of Psychiatry and Assistant Professor of Pediatrics Route 3, Box 273
 Ronald B. Luftig (1969), Ph.D. (Chicago)
Assistant Professor of Microbiology 5115 Old Well Street
 John G. Lundberg (1970), Ph.D. (Michigan)
Assistant Professor of Zoology 1609 Hollywood Street
 Peter L. Lutz (1970), Ph.D. (Glasgow Univ.)
Temporary Assistant Professor of Zoology 1123 Woodburn Road
 William S. Lynn, Jr. (1954), M.D. (Columbia)
Professor of Medicine and Associate Professor of Biochemistry 4014 Bristol Road
¹³⁴George W. Lynts (1965), Ph.D. (Wisconsin)
Associate Professor of Geology 3328 Rolling Hill Road
 George M. Lyon, Jr. (1967), M.D. (Duke)
Assistant Professor of Pediatrics 1510 Southwood Drive
¹³⁵John Nelson MacDuff (1956), M.M.E. (New York)
Professor of Mechanical Engineering 2733 Dogwood Road
 Barry B. MacKichan (1970), Ph.D. (Stanford)
Assistant Professor of Mathematics Route 6
 Ian R. MacNeil (1971), J.D. (Harvard)
Visiting Professor of Law Chapel Hill, N. C.
 Angus M. McBryde (1931), M.D. (Pennsylvania)
Professor of Pediatrics 2917 Welcome Drive
 Kenneth Scott McCarty (1959), Ph.D. (Columbia)
Professor of Biochemistry 3406 Westover Road
 Thomas E. McCollough (1961), Th.D. (Southern Baptist Theological Seminary)
Associate Professor of Religion 2722 Circle Drive
 Donald E. McCollum (1962), M.D. (Bowman Gray)
Professor of Orthopaedic Surgery 2207 Wilshire Drive
 George M. McCord, Jr. (1971), M.D. (Emory)
Associate in Radiology 3211 Denise Street
 Alice L. McCrea (1961), M.S. (Chicago)
Assistant Professor of Radiation Therapy Route 2, Umstead Road
 Thomas Edward McDonnell (1971), M.A. (Fordham)
Visiting Assistant Professor of Naval Science 4043 Kelly Drive
 Marjorie B. McElroy (1970), Ph.D. (Northwestern)
Assistant Professor of Economics Route 5, Box 195-A
 James A. McFarland (1968), M.D. (Johns Hopkins)
Assistant Professor of Community Health Sciences and Assistant
Professor of Medicine Chapel Hill, N. C.
 2704 Sevier Street

¹³²Sabbatical leave 1971-72.

¹³³Leave of absence, 1-1-71 through 12-31-72.

¹³⁴Sabbatical leave, spring 1971-72.

¹³⁵Sabbatical leave, spring 1971-72.

- Thomas M. McInnis, Jr. (1971), Ph.D. (North Carolina)
Temporary Instructor in Zoology 3-J Villa Apartments
 1505 Duke University Road
- Patrick Allen McKee (1969), M.D. (Oklahoma)
*Assistant Professor of Medicine and Assistant Professor
 of Biochemistry* 2616 Augusta Drive
- John C. McKinney (1957), Ph.D. (Michigan)
*Professor of Sociology and Professor of Medical
 Sociology in Department of Psychiatry* 1627 Marion Avenue
- Mary Helen McLachlan (1958), M.A. (Missouri)
Associate Professor of Dietetics and Acting Director 2022 Bivins Street
- Byron D. McLees (1967-69; 1971), Ph.D. (Johns Hopkins)
Associate in Medicine 108 Pawnee Court
- Michael E. McLeod (1966), M.D. (Duke)
Assistant Professor of Medicine 4007 Deepwood Circle
- Samuel M. McMahon (1968), M.D. (Ohio State)
Assistant Professor of Medicine 5343 Yardley Terrace
- Thomas Joseph McManus (1961), M.D. (Boston)
Associate Professor of Physiology and Pharmacology 1408 Oakland Avenue
- Andrew McPhail (1968), Ph.D. (Glasgow)
Associate Professor of Chemistry 5305 Partridge Street
- Harry Thurman McPherson (1955), M.D. (Duke)
Associate Professor of Medicine 3915 Nottaway Road
- George L. Maddox (1960), Ph.D. (Michigan State)
*Professor of Sociology and Professor of
 Medical Sociology in the Department of Psychiatry* 2750 McDowell Street
- Henry G. Magendantz (1970), M.D. (Duke)
Assistant Professor of Obstetrics and Gynecology 3306 Rolling Hill Road
- Moses Stephen Mahaley (1965), Ph.D. (Duke)
*Assistant Professor of Neurosurgery and Assistant Professor
 of Anatomy* 3940 Nottaway Road
 Apartment 49
- Edward P. Mahoney (1965), Ph.D. (Columbia)
Associate Professor of Philosophy 1000 North Duke Street
 Apartment D8
- Steven Maier (1971), Ph.D. (Stanford)
Assistant Professor of Management Sciences 1829 Front Street
- ¹³⁶Joseph M. Malin, Jr. (1968), M.D. (Georgetown)
Assistant Professor of Urology 416 Carolina Circle
- ¹³⁷James C. Maloney (1970), Ph.D. (South Carolina)
Assistant Professor of Physiology 3204 Sherbon Drive
- Charles Edward Mann (1970), B.S. (U. S. Naval Academy)
Visiting Assistant Professor of Naval Science 3503 Winding Way
- Charles Milton Mansbach (1970), M.D. (New York)
Assistant Professor of Medicine 2431 Tryon Road
- Mark Mantuani (1971), Ph.D. (Duke)
Visiting Assistant Professor of Geology 1609 Cole Mill Road
- ¹³⁸Bruno Maraviglia (1969), Ph.D. (Florence Univ., Italy)
Visiting Assistant Professor of Physics 2412 Vesson Avenue
- Peter N. Marinos (1968), Ph.D. (North Carolina State)
Associate Professor of Electrical Engineering 9-C Anderson Street Apartments
- Sidney David Markman (1947), Ph.D. (Columbia)
Professor of Art History and Archaeology 919 Urban Avenue
- Patricia H. Marschall (1971), LL.M. (Harvard)
Visiting Associate Professor of Law 1609 Ward

¹³⁶Through 12-31-70.

¹³⁷Through 9-7-71.

¹³⁸Through 2-1-70.

- Gail R. Marsh (1969), Ph.D. (Iowa)
Associate in Medical Psychology in the Department of Psychiatry 1506 Southwood Place
- David V. Martin (1962), Ed.D. (Duke)
Associate Professor of Education 1527 Hermitage Court
- ¹³⁹Dean F. Martin (1970), Ph.D. (Pennsylvania State)
Visiting Professor of Physiology and Pharmacology 806 Onslow Street
- ¹⁴⁰Joan C. Martin (1969), Ph.D. (Florida State Univ.)
Assistant Professor of Medical Psychology in the Department of Psychiatry 2921 Buckingham Road
 Box 2475
- Robert M. Martin, Jr. (1970), M.D. (Emory)
Associate in Psychiatry 217 Riverdale Drive
- Salutario J. R. Martínez (1971), M.D. (Univ. of Havana, Cuba)
Associate in Radiology Apartment H-13
 6001 LaSalle Street
- William M. Mason (1970), Ph.D. (Chicago)
Assistant Professor of Sociology and Anthropology 1601 Hermitage Court
- Raymond Massengill, Jr. (1964), Ed.D. (Virginia)
Associate Professor of Medical Speech Pathology, Division of Plastic and Maxillofacial Surgery 2734 Spencer Street
- ¹⁴¹Seymour Mauskopf (1964), Ph.D. (Princeton)
Assistant Professor of History 1900 Glendale Avenue
- ¹⁴²William Cary Maxwell (1930), Ph.D. (Heidelberg)
Associate Professor of German 142 Pinecrest Road
- Demmie G. Mayfield (1964), M.D. (Texas)
Associate Professor of Psychiatry 1923 Bedford Street
- ¹⁴³Leo F. Mazzochi (1970), M.D. (Med. Coll. of Virginia)
Associate in Radiology 3406 Rolling Hill Road
- Otto Meier, Jr. (1934), Ph.D. (Pennsylvania)
Professor of Electrical Engineering 113 Pinecrest Road
- ¹⁴⁴Elgin W. Mellown (1965), Ph.D. (London)
Associate Professor of English 1004 Minerva Avenue
- Lorne Mendell (1968), Ph.D. (Massachusetts Instit. of Tech.)
Assistant Professor of Physiology and Pharmacology 16-F Sharon Heights
 Chapel Hill, N. C.
- ¹⁴⁵Elijah Eugene Menefee, Jr. (1940), M.D. (Duke)
Professor of Medicine 2205 Cranford Road
- Daniel B. Menzel (1971), Ph.D. (California)
Visiting Associate Professor of Physiology 932 Clarion Drive
- ¹⁴⁶Wolfgang J. Mergner (1970), M.D. (Heidelberg)
Associate in Pathology 107 Newell Street
- ¹⁴⁷James L. Meriam (1963), Ph.D. (Yale)
Professor of Engineering Mechanics 3434 Rugby Road
- ¹⁴⁸Richard S. Metzgar (1962), Ph.D. (Buffalo)
Associate Professor of Immunology 3616 Westover Road
- Horst Meyer (1959), Docteur ès Sciences (Geneva)
Professor of Physics 2716 Montgomery Street
- Eric M. Meyers (1969), Ph.D. (Harvard)
Associate Professor of Religion 1911 C House Avenue

¹³⁹Through 8-31-71.

¹⁴⁰Leave of absence, 7-1-71 through 6-30-72.

¹⁴¹Sabbatical leave, fall 1971-72 and leave of absence, spring 1971-72.

¹⁴²Retired 2-28-71.

¹⁴³Through 6-30-71.

¹⁴⁴Sabbatical leave 1971-72.

¹⁴⁵Retired 10-1-71.

¹⁴⁶Through 2-1-71.

¹⁴⁷Leave of absence, spring 1971-72.

¹⁴⁸Sabbatical leave 10-1-71 through 3-31-72.

- M. Victor Michalak (1950), Ph.D. (Indiana)
Associate Professor of English 804 Louise Circle
- Paul A. Mickey (1970), Th.D. (Princeton)
Assistant Professor of Pastoral Theology 1100 Woodburn Road
- Donald S. Miller (1969), M.D. (Harvard)
Assistant Professor of Medicine 2711 University Drive
- Gustavus H. Miller (1955), Ph.D. (Michigan)
Assistant Professor of Romance Languages Bartram Drive
 Chapel Hill, N. C.
- Martin A. Miller (1970), Ph.D. (Chicago)
Assistant Professor of History 619 Hammond Street
- Elliott Mills (1968), Ph.D. (Columbia)
Assistant Professor of Physiology and Pharmacology 3102 Oxford Drive
- Wilma A. Minniear (1964), M.S.N. (Western Reserve)
Professor of Nursing 5203 Shady Bluff Road
- Gerald C. Monsman (1965), Ph.D. (Johns Hopkins)
Associate Professor of English 1421 N. Mangum Street
- Byron T. Mook (1971), B.A. (Oberlin)
Instructor in Political Science 802 Green Street
- John W. Moore (1961), Ph.D. (Virginia)
Professor of Physiology 605 Kenmore Road
- Lawrence C. Moore, Jr. (1966), Ph.D. (California Institute of Technology)
Assistant Professor of Mathematics 2104 Sprunt Street
- James J. Morris (1963), M.D. (State Univ. of New York)
Associate Professor of Medicine 2903 Buckingham Road
- Christopher Morse (1971), S.T.M. (Union Theological Seminary, New York)
Visiting Instructor of Systematic Theology 116 Buchanan Boulevard
- John D. Moses (1970), Ph.D. (Duke)
Instructor in Physics 4 Ashley Road
- Montrose J. Moses (1959), Ph.D. (Columbia)
Professor of Anatomy 152 Pinecrest Road
- Earl George Mueller (1945), Ph.D. (Iowa)
Professor of Art 1001 Gloria Avenue
- Julia Wilkinson Mueller (1939-41; 1946), M.A. (Iowa)
Professor of Music 1516 Kent Street
- Bruce Muga (1967), Ph.D. (Illinois)
Associate Professor of Civil Engineering 4110 King Charles Road
- Bruce R. Munson (1970), Ph.D. (Minnesota)
Assistant Professor of Mechanical Engineering 2128 Englewood Avenue
- Arvin W. Murch (1969), Ph.D. (Yale)
Assistant Professor of Sociology 2708 Circle Drive
- Roland Murphy (1967-1968; 1971), S.T.D. (Catholic Univ.)
Professor of Old Testament Brown House
- Francis J. Murray (1960), Ph.D. (Columbia)
Professor of Mathematics 1011 Homer Street
- James C. Murray (1967), Ph.D. (Cornell)
Assistant Professor in Romance Languages 9-B Anderson Street Apartments
- Gerard Musante (1971), Ph.D. (Tennessee)
Associate in Medical Psychology in the Department of Psychiatry Continental Drive
- ¹⁴⁹A. Wendell Musser (1963), M.D. (Indiana)
Associate Professor of Pathology 1231 Somerset
 McLeon, Va.
- George C. Myers (1968), Ph.D. (Washington)
Professor of Sociology 12 Scott Place
- Hiroshi Nagaya (1966), M.D. (Tokyo)
Assistant Professor of Medicine 2910 Friendship Road

¹⁴⁹Leave of absence 10-1-70 through 9-30-72.

- Toshio Narahashi (1962-63; 1965), Ph.D. (Tokyo)
Professor of Physiology 2964 Friendship Road
- Thomas H. Nash, Jr. (1959), M.A. (North Carolina)
Assistant Professor of Mechanical Engineering 2527 Wrightwood Avenue
- Blaine S. Nashold, Jr. (1957), M.D. (McGill)
Associate Professor of Surgery in Division of Neurosurgery 410 East Forest Hills Boulevard
804 Tinkerbell Road
Chapel Hill, N. C.
- Sydney H. Nathans (1966), Ph.D. (Johns Hopkins)
Assistant Professor of History
- Dorothy E. Naumann (1963), M.D. (Syracuse)
Associate in Community Health Sciences 2404 Tampa Avenue
- Aubrey Willard Naylor (1952), Ph.D. (Chicago)
Professor of Botany 2430 Wrightwood Avenue
- ¹⁵⁰ Thomas Herbert Naylor (1964), Ph.D. (Tulane)
Professor of Economics 2727 Spencer Street
- Francis A. Neelon (1969), M.D. (Harvard)
Assistant Professor of Medicine 2216 West Club Boulevard
- Glenn Robert Negley (1946), Ph.D. (Chicago)
Professor of Philosophy Apartment 8
2330 Hilton Avenue
- Charles W. Neville, Jr. (1964), M.D. (Vanderbilt)
Associate Professor of Psychiatry 56 Woodbury Road
Asheville, N. C.
- Barbara Carol Newborg (1952), M.D. (Johns Hopkins)
Associate in Medicine 1503 Virginia Avenue
- Henry Winston Newson (1948), Ph.D. (Chicago)
James B. Duke Professor of Physics 1111 North Gregson Street
- ¹⁵¹ Francis Newton (1967), Ph.D. (North Carolina)
Professor of Latin 2809 Legion Avenue
- Khye Weng Ng (1970), M.B.B.S. (Malaya)
Associate in Neurology Route 3
Hillsborough, N. C.
- Jack L. Nichols (1970), Ph.D. (Alberta)
Assistant Professor of Microbiology 5809 Sanstone Drive
- William McNeal Nicholson (1935), M.D. (Johns Hopkins)
Professor of Medicine 824 Anderson Street
- R. Bruce Nicklas (1965), Ph.D. (Columbia)
Professor of Zoology 3101 Camelot Court
- Charles E. V. Nixon (1971), Ph.D. (Michigan)
Assistant Professor of Classic Studies 1013 Gloria Avenue
- Loren W. Nolte (1966), Ph.D. (Michigan)
Associate Professor of Electrical Engineering and Associate Professor of Biomedical Engineering 2708 Sevier Street
- Charles Bryan Norton (1971), M.D. (Duke)
Associate in Psychiatry 4637 Pinedale Drive
- Sue Norville (1966), M.S.N. (Emory)
Associate Professor of Nursing Apartment 28-D
705 Louise Circle
- David W. Novak (1970), Ph.D. (Kentucky)
Assistant Professor of Medical Psychology in the Department of Psychiatry Apartment 15
18 Balmoray Court
- Richey A. Novak (1969), Ph.D. (Johns Hopkins)
Assistant Professor of German 3927 Swathmore Drive
- John B. Nowlin (1967), M.D. (Duke)
Assistant Professor in Community Health Sciences 1310 E. Leon Street
- Yasuhiko Nozaki (1966), Ph.D. (Tokyo)
Associate in Biochemistry 2527 Vesson Avenue

¹⁵⁰Sabbatical leave, fall 1971-72.

¹⁵¹Sabbatical leave 1971-72.

- James G. Nuckolls (1971), M.D. (Duke)
Associate in Medicine 120 Newell Street
- Holger Olof Nygard (1960), Ph.D. (California)
Professor of English 4015 Cole Mill Road
- John F. Oates (1967), Ph.D. (Yale)
Professor of Classical Studies 1025 Dacian Avenue
- William M. O'Barr (1969), Ph.D. (Northwestern)
Assistant Professor of Anthropology 1700 Shawnee Street
- Walter D. Obrist (1957), Ph.D. (Northwestern)
*Professor of Medical Psychology in Department of
 Psychiatry and Lecturer in Psychology* 2604 McDowell Street
- Guy Leary Odom (1943), M.D. (Tulane)
Professor of Neurosurgery 2812 Chelsea Circle
- William M. O'Fallon (1965), Ph.D. (Vanderbilt)
*Associate Professor of Community Health Sciences
 and Assistant Professor of Mathematics* Glen Heights
- Fearghus T. O'Foghludha (1970), Ph.D. (National Univ. of Ireland)
Professor of Radiology 1513 Pinecrest Road
- H. Newland Oldham, Jr. (1970), M.D. (Baylor)
Assistant Professor of Surgery 1300 Oakland
- Samuel R. Oleinick (1969), Ph.D. (Pennsylvania)
Assistant Professor of Immunology 1902 Cole Mill Road
- Harold Oliver (1970), M.F.A. (Princeton)
Visiting Assistant Professor of Music 1509 Hollywood Street
- F. Hodge O'Neal (1959), S.J.D. (Harvard)
Professor of Law Route 1, Box 172
 Mt. Sinai Road
- ¹⁵²Bernard V. O'Neill, Jr. (1968), Ph.D. (Brown)
Assistant Professor of Mathematics 702 North Buchanan Boulevard
- Edward Stewart Orgain (1934), M.D. (Virginia)
Professor of Medicine 3321 Devon Road
- Robert Tappan Osborn (1954), Ph.D. (Drew)
Professor of Religion 2732 McDowell Street
- Shirley K. Osterhout (1967), M.D. (Duke)
Associate in Pediatrics 600 Starmont Drive
- Suydam Osterhout (1959), Ph.D. (Rockefeller Institute)
*Associate Professor of Microbiology and Associate Professor of
 Medicine* 600 Starmont Drive
- Athos Ottolenghi (1959), M.D. (Tavia, Italy)
Associate Professor of Pharmacology 1510 Woodburn Street
- Harry Ashton Owen, Jr. (1951), Ph.D. (North Carolina State)
Professor of Electrical Engineering 2714 McDowell Street
- George Padilla (1965), Ph.D. (California)
Associate Professor of Physiology 2027 Bivins Street
- David Paletz (1967), Ph.D. (California at Los Angeles)
Assistant Professor of Political Science 1311 Carolina Avenue
- Aubrey Edwin Palmer (1944), B.S., C.E. (Virginia)
Associate Professor of Civil Engineering 2525 Highland Avenue
- Richard A. Palmer (1966), Ph.D. (Illinois)
Associate Professor of Chemistry 126 Pinecrest Road
- Erdman B. Palmore (1967), Ph.D. (Columbia)
*Associate Professor of Medical Sociology in Department of
 Psychiatry and Associate Professor of Sociology* 19 Scott Place
- ¹⁵³Charles H. Parker (1970), M.D. (Pittsburgh)
Associate in Obstetrics and Gynecology

¹⁵²Through 8-31-71.

¹⁵³On military leave 8-1-70 through 7-31-72.

- Harold Talbot Parker (1939), Ph.D. (Chicago)
Professor of History 1005 Demerius Street
- Joseph B. Parker, Jr. (1970), M.D. (Tennessee)
Professor of Psychiatry 1912 Wilshire Drive
- Roy T. Parker (1920), M.D. (Medical College of Virginia)
F. Bayard Carter Professor of Obstetrics and Gynecology 111 Pinecrest Road
- Harry B. Partin (1964), Ph.D. (Chicago)
Associate Professor of Religion 2739 Spencer Street
- Joel Francis Paschal (1954), Ph.D. (Princeton)
Professor of Law 1527 Pinecrest Road
- Merrill Lee Patrick (1964), Ph.D. (Carnegie Instit. of Tech.)
Associate Professor of Computer Science 25 Scott Place
- ¹⁵⁴Ransom Rathbone Patrick (1954), Ph.D. (Princeton)
Professor of Art History 116 Pinecrest Road
- Eugene C. Patterson (1971), A.B. (Georgia)
Professor of the Practice of Political Science Villa Apartment 2-I
- F. M. S. Patterson (1968), M.D. (Pennsylvania)
Assistant Professor of Surgery 1505 Duke University Road
- Lewis Patton (1926), Ph.D. (Yale)
Professor of English 410 Clayton Road
 Chapel Hill, N. C.
- Z. Daniel Pauk (1967), M.D. (Iowa)
Assistant Professor of Psychiatry 614 Swift Avenue
- Robert G. Paul (1970), Ph.D. (Oklahoma)
Associate in Audiology and Speech Pathology in the Department of Surgery 1802 Woodburn Road
- Hilda Pavlov (1960), M.A. (Leningrad)
Assistant Professor of Slavic Languages 3403 Rolling Hill Road
- Michael I. Pavlov (1960), M.A. (Leningrad)
Assistant Professor of Slavic Languages 709 Reta Road
- William Bernard Peach (1951), Ph.D. (Harvard)
Professor of Philosophy 709 Reta Road
- Daniel T. Peak (1969), M.D. (Wisconsin)
Assistant Professor of Psychiatry Route 2, Box 474
- George W. Pearsall (1964), Sc.D. (Massachusetts Instit. of Tech.)
Professor of Mechanical Engineering 3307 Pinafore Drive
- Talmage Lee Peele (1939), M.D. (Duke)
Professor of Anatomy; Associate Professor of Neurology; Assistant Professor of Pediatrics; and Lecturer in Psychology 2941 Welcome Drive
- Charles Henry Peete, Jr. (1953), M.D. (Harvard)
Professor of Obstetrics and Gynecology KD2 University Apartments
- William P. J. Peete (1955), M.D. (Harvard)
Professor of Surgery 42 Beverly Drive
- Ronald Perkins (1969), Ph.D. (Indiana)
Associate Professor of Geology 2814 Chelsea Circle
- Martha Anne Perry (1970), Ph.D. (Syracuse)
Associate in Medical Psychology in the Department of Psychiatry and Associate in Pediatrics 2719 Montgomery
- Edythe Mae Persing (1964), M.N. (Western Reserve)
Assistant Professor of Nursing Apartment 22D
 200 Seven Oaks Road
- Walter Scott Persons (1930), A.B. (Duke)
Associate Professor of Physical Education Route 2
 Chapel Hill, N. C.
- ¹⁵⁵Ernst Peschel (1953), M.D. (Berlin)
Professor of Medicine 612 Swift Avenue
- 2306 Pershing Street

¹⁵⁴Deceased 4-27-71.

¹⁵⁵Retired 8-31-71.

- Robert H. Peter (1967), M.D. (Duke)
Assistant Professor of Medicine 2710 McDowell Street
- Russell Petersen (1971), Ph.D. (Univ. of Washington)
Assistant Professor of Management Sciences 1901 Cannon Street
- Ray C. Petry (1937), Ph.D. (Chicago)
James B. Duke Professor of Church History 128 Pinecrest Road
- Olan Lee Petty (1962), Ph.D. (Iowa)
Professor of Education 2605 McDowell Street
- Eric A. Pfeiffer (1966), M.D. (Washington)
Associate Professor of Psychiatry 3203 Cromwell Road
- John Bernard Pfeiffer, Jr. (1949), M.D. (Cornell)
Professor of Medicine 3414 Rugby Road
- Leland R. Phelps (1961), Ph.D. (Ohio State)
Professor of German 2255 Cranford Road
- James Henry Phillips (1946), Ph.D. (Yale)
Professor of Religion 2517 Perkins Road
- Jane Philpott (1951), Ph.D. (Iowa)
Professor of Botany 2260 Cranford Road
- John E. P. Pickett (1970)
*Associate in Pathology and Instructor in
School of Medical Technology* 3323 Pinafore Drive
- Kenneth LeRoy Pickrell (1944), M.D. (Johns Hopkins)
Professor of Plastic Surgery and Maxillofacial Surgery 3 Sylvan Road
- ¹⁵⁶Orrin H. Pilkey (1965), Ph.D. (Florida State)
Associate Professor of Geology Route 3, Highway 70
Hillsborough, N. C.
- Theo Clyde Pilkington (1961), Ph.D. (Duke)
*Professor of Biomedical Engineering and
Professor of Electrical Engineering* 2718 Spencer Street
- Robert A. Pittillo, Jr. (1968), Ed.D. (Duke)
Associate Professor of Education 2709 Spencer Street
- William D. Poe (1971), M.D. (Bowman Gray)
Assistant Professor of Community Health Sciences 406 Elliott Road
Chapel Hill, N. C.
- Jacques C. Poirier (1955), Ph.D. (Chicago)
Professor of Chemistry 210 West Lavender Street
- Jerko Poklepovic (1971), M.D. (Univ. of Zagreb, Yugoslavia)
Associate in Radiology Apartment C-2
3600 Tremont Drive
- Grace Hilford Polansky (1968), M.S. (Western Reserve)
Associate in Psychiatric Social Work 504 Watts Street
- Louis R. Pondy (1967), Ph.D. (Carnegie Institute of Technology)
*Associate Professor of Business Administration and Associate Professor
of Community Health Sciences* 1013 Monmouth Avenue
- F. Stanley Porter (1964), M.D. (Johns Hopkins)
Professor of Pediatrics 2609 Cornwallis Road
- Ned A. Porter (1969), Ph.D. (Harvard)
Assistant Professor of Chemistry Apartment 86-B
3022 Chapel Hill Road
- Richard M. Portwood (1959), M.D. (Southwestern)
*Assistant Professor of Medicine and Assistant Professor of
Community Health Sciences* 54 Beverly Drive
- Raymond W. Postlethwait (1955), M.D. (Duke)
Professor of Surgery 3604 Dover Road
- ¹⁵⁷William H. Poteat (1960), B.D., Ph.D. (Duke)
Professor of Religion and Comparative Studies 621 Greenwood Road
Chapel Hill, N. C.

¹⁵⁶Sabbatical leave 1971-72.

¹⁵⁷Leave of absence, spring 1970-71.

- Lois S. Pounds (1969), M.D. (Pittsburgh)
*Assistant Professor of Pediatrics, Associate in
Community Health Sciences and Assistant Professor
of Nursing* Apartment 17-B
Valley Terrace Apartments
- Benjamin E. Powell (1946), Ph.D. (Chicago)
Professor in the Faculty of Arts and Sciences 3609 Hathaway Road
- Philip C. Pratt (1966), M.D. (Johns Hopkins)
Professor of Pathology 2707 Sevier Street
- ¹⁵⁸Vernon Pratt (1964), M.F.A. (San Francisco Art Institute)
Assistant Professor of Art 1903 Glendale Avenue
Route 1
Bahama, N. C.
- Richard Lionel Predmore (1950), D.M.L. (Middlebury)
Professor of Romance Languages 2722 McDowell Street
- Jack J. Preiss (1959), Ph.D. (Michigan State)
Professor of Sociology 106 Wicklow Lane
- ¹⁵⁹T. J. Prendergast, Jr. (1971), M.D. (Washington Univ.)
Associate in Community Health Sciences 1124 Woodburn Road
- ¹⁶⁰Richard A. Preston (1965), Ph.D. (Yale)
William K. Boyd Professor of History Box 4813
- ¹⁶¹E. Reynolds Price (1958), B.Litt. (Oxford)
Associate Professor of English Duke Station
- James Ligon Price, Jr. (1952), Ph.D. (Cambridge)
Professor of Religion 2723 Circle Drive
- ¹⁶²Moshe Prywes (1971), M.D. (Warsaw Univ., Poland)
Visiting Professor of Medical Education Box 3701
- A. Kenneth Pye (1966), LL.M. (Georgetown)
Professor of Law 2802 Chelsea Circle
- Steven H. Quarfordt (1968), M.D. (New York)
Assistant Professor of Medicine 3300 Pinafore Drive
- Louis D. Quin (1957), Ph.D. (North Carolina)
Professor of Chemistry 2740 McDowell Street
- Galen W. Quinn (1958), D.D.S. (Tennessee)
Professor of Orthodontics 806 East Forest Hills Boulevard
- ¹⁶³Edward H. Rabin (1970), LL.B. (Columbia)
Visiting Professor of Law 2517 Wrightwood
- K. V. Rajagopalan (1966), Ph.D. (Madras)
Associate Professor of Biochemistry 2214 Elmwood Avenue
- Charles W. Ralston (1954), Ph.D. (Duke)
Professor of Forest Soils 2531 Wrightwood Avenue
- Dietolf Ramm (1969), Ph.D. (Duke)
*Assistant Professor of Computer Science and
Assistant Professor of Information Sciences in Psychiatry* 1609 Sycamore Street
- Dale B. J. Randall (1957), Ph.D. (Pennsylvania)
Professor of English 2620 University Drive
- Norman B. Ratliff (1968), M.D. (Duke)
Associate Professor of Pathology 2718 McDowell Street
- Calla Ann Raynor (1962), M.A.T. (North Carolina)
Assistant Professor of Physical Education 858 Louise Circle
- Frank Thompson Read (1968), LL.B. (Duke)
Associate Professor of Law 5223 Partridge
- Kenneth James Reardon (1947), M.A. (Boston)
Associate Professor of English 2511 Winton Road

¹⁵⁸Sabbatical leave, spring 1971-72.

¹⁵⁹Through 8-31-71.

¹⁶⁰Sabbatical leave 1971-72.

¹⁶¹Sabbatical leave 1971-72.

¹⁶²Through 12-31-71.

¹⁶³Through 6-30-71.

- John B. Reckless (1963), M.D. (Birmingham)
*Associate Professor of Psychiatry and Associate
 Professor of Nursing* 2437 Tryon Road
- John William Reed (1970), M.D. (Bowman Gray)
Assistant Professor of Ophthalmology 3212 Cromwell Road
- Michael K. Reedy (1969), M.D. (Washington)
Associate Professor of Anatomy 2525 Perkins
- Eva Oldham Reese (1971), B.S. (Duke)
Associate in Ophthalmology 901 Camden Avenue
- Edmund Reiss (1967), Ph.D. (Harvard)
Professor of English Dumont Road, Route 1
 Hillsborough, N. C.
- George F. Reiter (1971), Ph.D. (Stanford)
Visiting Assistant Professor of Physics Apartment 18-B
 Colonial Apartments
- ¹⁶⁴Burton W. Renager (1968), B.S. (Memphis State)
Visiting Assistant Professor of Naval Science 3207 Shaftsbury Drive
- ¹⁶⁵Eugene M. Renkin (1963), Ph.D. (Harvard)
Professor of Physiology 2028 Pershing Street
- Adam W. Renuart (1961), M.D. (Duke)
Assistant Professor of Pediatrics 1201 Shepherd Street
- William A. Reppy, Jr. (1971), J.D. (Stanford)
Assistant Professor of Law 604 Laurel Hill Road
 Chapel Hill, N. C.
- Jacqueline A. Reynolds (1969), Ph.D. (Washington)
*Assistant Professor of Biochemistry and Assistant
 Professor in Anatomy* 1430 North Mangum Street
- ¹⁶⁶Thomas D. Reynolds (1953), Ph.D. (Duke)
Associate Professor of Mathematics 2502 Wrightwood Avenue
- John McFarlane Rhoads (1956), M.D. (Temple)
*Professor of Psychiatry and Lecturer of
 Pastoral Care in Divinity School* 2404 Prince Street
- Reed P. Rice (1965), M.D. (Indiana)
Associate Professor of Radiology 900 Cedar Falls Road
 Chapel Hill, N. C.
- David C. Richardson (1969), Ph.D. (Massachusetts Instit. of Tech.)
Assistant Professor of Biochemistry Route 1, Box 92B
 Bahama, N. C.
- Jane Shelby Richardson (1970), M.A.T. (Harvard)
Associate in Anatomy 2608 Francis Street
- Lawrence Richardson, Jr. (1966), Ph.D. (Yale)
*Professor of Latin Department of
 Classical Studies* 1103 North Gregson Street
- McMurry S. Richey (1954), B.D., Ph.D. (Duke)
Professor of Theology and Christian Nurture 2725 Dogwood Road
- ¹⁶⁷Mac Linscott Ricketts (1965), Ph.D. (Chicago)
Assistant Professor of Religion 3318 Dixon Road
- John D. Riebel (1962), M.A. (Duke)
Assistant Professor of Physical Education 60 Oakwood Drive
 Chapel Hill, N. C.
- Eberhard Karl Riedel (1971), Dr. Rer. Nat. (Technische Univ., Munich, Germany)
Assistant Professor of Physics 1008½ Gloria Avenue
- Kent J. Rigsby (1971), M.A. (Univ. of Toronto)
Assistant Professor of Classical Studies Apartment O-7
 2800 Croasdaile Drive
- Dana Phelps Ripley (1959), Ph.D. (North Carolina)
Associate Professor of Romance Languages 1303 Dollar Avenue
- ¹⁶⁸Joann Ritchie (1967), M.N. (Texas Woman's Univ.)
Assistant Professor of Nursing Apartment B-11
 1829 Front Street

¹⁶⁴Through 6-30-71.

¹⁶⁵Sabbatical leave 1-15-72 through 7-15-72.

¹⁶⁶Sabbatical leave, fall 1971-72; through 8-31-71.

¹⁶⁷Through 8-31-71.

¹⁶⁸Through 8-31-71.

- Nathan Russell Roberson (1963), Ph.D. (Johns Hopkins)
Associate Professor of Physics 3406 Ogburn Court
- George W. Roberts (1971), Ph.D. (Cambridge) 23 Carriage House Apartments
Associate Professor of Philosophy 200 Seven Oaks Road
- Jesse Earl Roberts, Jr. (1968), M.D. (Louisiana State)
Assistant Professor of Medicine and Assistant
Professor of Community Health Sciences 2629 Cornwallis Road
- ¹⁶⁹John Henderson Roberts (1931), Ph.D. (Texas)
Professor of Mathematics 2813 Legion Avenue
- J. David Robertson (1966), M.D. (Harvard), Ph.D. (Massachusetts Instit. of Tech.)
Professor of Anatomy 32 Oak Drive
- Arvin E. Robinson (1971), M.D. (Med. Coll. of Virginia)
Assistant Professor of Radiology 1712 Woodburn Road
- Charles K. Robinson (1961), Ph.D. (Duke)
Associate Professor of Philosophical Theology 2203 Pike Street
- David W. Robinson (1971), M.D. (Michigan)
Associate in Psychiatry 2802 Friendship Circle
- George M. Robinson (1971), Ph.D. (Chicago)
Assistant Professor of Psychology Apartment 15
 2009 Southwood Drive
- Hugh G. Robinson (1964), Ph.D. (Duke)
Professor of Physics 2749 McDowell Street
- Roscoe R. Robinson (1962), M.D. (Oklahoma)
Professor of Medicine 3929 Nottaway Road
- William James Kenneth Rockwell (1968), M.D. (Duke)
Assistant Professor of Psychiatry 3519 Donnigale Street
- Charles R. Roe (1969), M.D. (Duke)
Assistant Professor of Pediatrics 1409 Colewood Drive
- Robert Rolf (1971), M.A. (Hawaii)
Instructor in History Apartment 1
 536 Hardee
- Theodore Ropp (1938), Ph.D. (Harvard)
Professor of History 302 East Woodridge Drive
- Robert A. Rosati (1971), M.D. (Duke)
Associate in Medicine and Associate in Community
Health Sciences 3615 Randolph Road
- Carl M. Rose, Jr. (1967), Ph.D. (Chicago)
Assistant Professor of Physics 3109 Sherbon Drive
- Myron Rosenthal (1971), Ph.D. (Duke)
Assistant Professor of Physiology Apartment C-10
 3600 Tremont Drive
- Allen David Roses (1970), M.D. (Pennsylvania)
Associate in Medicine Route 7, Box 216
- Norman F. Ross (1937), D.D.S. (Temple)
Associate Professor of Dentistry 2811 Chelsea Circle
- Wendell F. Rosse (1966), M.D. (Chicago)
Associate Professor of Medicine and Associate Professor
of Immunology 3553 Hamstead Court
- Michael Rotman (1971), M.D. (Texas)
Associate in Medicine 1808 Chapel Hill Road
- ¹⁷⁰Simon Rottenberg (1965), Ph.D. (Harvard)
Professor of Economics 1601 Hermitage Court
- Malcolm H. Rourke (1971), M.D. (Pennsylvania)
Assistant Professor of Pediatrics 3621 Cole Mill Road
- Patricia B. Rouse (1971), B.S. (Tufts)
Associate in Physical Therapy Apartment F-7
 3600 Tremont Drive
- Donald Francis Roy (1950), Ph.D. (Chicago)
Professor of Sociology 604 North Gregson Street

¹⁶⁹Retired 8-31-71.

¹⁷⁰Through 8-31-71.

- John Jesse Rudin, II (1945), B.D., Ph.D. (Northwestern)
Associate Professor of Christian Communications 1640 Marion Street
- Alfred J. Rufty (1971), M.D. (Louisiana State)
Associate in Medicine 1614 Woodburn Road
- Ralph Wayne Rundles (1945), Ph.D. (Cornell), M.D. (Duke)
Professor of Medicine 3608 Westover Road
- Neal Person Rutledge (1970), LL.B. (Yale)
Professor of Law 4002 Colorado Avenue
- David Coston Sabiston, Jr. (1964), M.D. (Johns Hopkins)
James B. Duke Professor of Surgery 1528 Pinecrest Road
- Anne E. Sagburg (1956), M.D. (Onslow)
Associate in Psychiatry Highland Hospital
 Asheville, N. C.
- Harvey J. Sage (1964), Ph.D. (Yale)
Associate Professor of Biochemistry and Assistant Apartment 8
Professor of Pathology 2011 Bedford Street
- Herman Salinger (1955), Ph.D. (Yale)
Professor of German 3444 Rugby Road
- Jay S. Salkin (1969), Ph.D. (Northwestern)
Assistant Professor of Economics Department of Economics
- Herbert A. Saltzman (1958), M.D. (Philadelphia)
Professor of Medicine 2728 McDowell Street
- John Salzano (1958), Ph.D. (Iowa State)
Associate Professor of Physiology 607 Starmont Drive
- Aaron P. Sanders (1956), Ph.D. (North Carolina)
Professor of Radiology and Assistant Professor of Physiology F-16 Morreene Road
- ¹⁷¹Charles Richard Sanders (1937), Ph.D. (Chicago)
Professor of English 103 Pinecrest Road
- David Sanford (1970), Ph.D. (Cornell)
Associate Professor of Philosophy 2227 Cranford Road
- ¹⁷²Baxter B. Sapp, Jr. (1960), D.D.S. (Temple)
Associate in Dentistry 3514 Rugby Road
- Eugenia Curtis Saville (1947), M.A. (Columbia)
Associate Professor of Music 1103 Anderson Street
- Lloyd Blackstone Saville (1946), Ph.D. (Columbia)
Professor of Economics 1103 Anderson Street
- Saul M. Schanberg (1967), Ph.D. (Yale)
Associate Professor of Clinical Pharmacology and
Assistant Professor of Neurology 2516 Sevier Street
- Harold Schiffman (1963), Ph.D. (Princeton)
Professor of Psychology 18 Heath Place
- ¹⁷³Bruce M. Schlein (1969), M.D. (New York State)
Assistant Professor of Pathology 1023 Sycamore Street
- Knut Schmidt-Nielsen (1952), Ph.D. (Copenhagen)
James B. Duke Professor of Physiology % Zoology Department
in the Department of Zoology Duke University
- David W. Schomberg (1968), Ph.D. (Purdue)
Associate Professor of Obstetrics and Gynecology and Rt. 1, Box 304A
Assistant Professor of Physiology Hillsborough, N. C.
- James Morse Schooler, Jr. (1970), Ph.D. (Wisconsin)
Assistant Professor of Physiology 410 Pecoe Avenue
- Kenneth J. Schoonhagen (1969), M.H.A. (Duke)
Instructor of Graduate Programs in Hospital Administration 4312 Samoa Court

¹⁷¹Sabbatical leave 1972-73.

¹⁷²Through 3-31-71.

¹⁷³Through 8-1-71.

- ¹⁷⁴Horst H. Schultz (1970), Ph.D. (Technical Univ., Berlin)
Associate in Biochemistry
 Esther Louise Schwerman (1947), Ph.D. (Northwestern)
Assistant Professor of English
 Anne Firor Scott (1961), Ph.D. (Radcliffe)
Professor of History
- ¹⁷⁵David William Scott (1971), Ph.D. (Yale)
Assistant Professor of Immunology
 James F. Scott, Jr. (1969), M.B.A. (George Washington Univ.)
Associate Professor of Aerospace Studies
- ¹⁷⁶R. B. Y. Scott (1971), Ph.D. (Toronto)
Visiting Professor of Divinity
- ¹⁷⁷R. Taylor Scott (1971), Th.M. (Duke)
Visiting Assistant Professor of Religion
 William Evans Scott (1958), Ph.D. (Yale)
Professor of History
- Richard A. Scoville (1961), Ph.D. (Yale)
Assistant Professor of Mathematics
- Judy Harrington Seaber (1969), B.A. (Emory)
Associate in Ophthalmology
- Will Camp Sealy (1946), M.D. (Emory)
Professor of Thoracic Surgery
- Richard B. Searles (1965), Ph.D. (California at Berkeley)
Associate Professor of Botany
- Hilliard Foster Seigler (1967), M.D. (North Carolina)
Associate Professor of Surgery and Associate Professor of Immunology
- James Husted Semans (1953), M.D. (Johns Hopkins)
Professor of Urology
- Stuart M. Sessoms (1968), M.D. (Med. Coll. of Virginia)
Professor of Medicine
- James Lewis Shafland (1969), Ph.D. (Chicago)
Assistant Professor of Anatomy
- ¹⁷⁸Mary E. Shaughnessy (1969), M.S. (Simmons)
Associate Professor of Nursing
- M. Jafar Sheikolislam (1970), M.D. (Tehran, Iran)
Assistant Professor of Anesthesiology
- Marion L. Shepard (1967), Ph.D. (Iowa State)
Associate Professor of Mechanical Engineering
- ¹⁷⁹Bobby Foster Sherwood (1965), D.V.M. (Georgia)
Assistant Professor of Veterinary Medicine
- Melvin G. Shimm (1953), LL.B. (Yale)
Professor of Law
- William Warner Shingleton (1947), M.D. (Bowman Gray)
Professor of Surgery
- Joseph Robert Shoenfield (1952), Ph.D. (Michigan)
Professor of Mathematics
- Romesh Kumar Shonek (1970), M.A. (Punjab Univ.)
Lecturer of Hindi-Urdu
- 918 Monmouth Avenue
 909 Lambeth Circle
 1028 Highland Woods
 Chapel Hill, N. C.
 Apartment 7-A
 610 LaSalle Street
 1730 Euclid Road
 Parkwood, N. C.
 215 Varsity Avenue
 Princeton, New Jersey
 4809 Glen Forest
 Raleigh, N. C.
 1311 Dollar Avenue
 2114 Sprunt Street
 Richmond Downs
 Hillsborough, N. C.
 2232 Cranford Road
 1800 Woodburn Road
 4006 King Charles Street
 1415 Bivins Street
 3432 Dover Road
 808 Green Street, C-3
 Apartment D-5
 1829 Front Street
 1101 Anderson Street
 3421 Pinafore Drive
 5020 Autumn Drive
 2429 Wrightwood Avenue
 3866 Somerset Drive
 Apartment 2-G
 311 LaSalle Street
 2227 Lafayette Street
- ¹⁷⁴Through 8-31-70.
¹⁷⁵Through 12-31-71.
¹⁷⁶Through 5-31-71.
¹⁷⁷Through 5-31-71.
¹⁷⁸Through 8-31-71.
¹⁷⁹Through 4-30-71.

- William Derek Shows (1967), Ph.D. (Duke)
*Assistant Professor of Medical Psychology in the
 Department of Psychiatry; Lecturer in Psychology
 and Lecturer in Religion* 3707 Brixton Lane
 180George H. Shriver (1970), Ph.D. (Duke) 117 West South
Visiting Professor in Divinity Wake Forest, N. C.
- R. Baird Shuman (1962), Ph.D. (Pennsylvania)
Professor of Education 3708 Lykan Parkway
- James B. Sidbury (1961), M.D. (Columbia)
Professor of Pediatrics 4044 Nottaway Road
- Lewis Siegel (1968), Ph.D. (Johns Hopkins)
Assistant Professor of Biochemistry 3006 Glendale Avenue
- Herbert O. Sieker (1955), M.D. (Washington)
Professor of Medicine 3949 Plymouth Road
- Bernard Silberman (1967), Ph.D. (Michigan)
Professor of History 14 Heath Place
- Harold R. Silberman (1962), M.D. (Washington)
Associate Professor of Medicine 2718 Princeton Drive
- Donald Silver (1964), M.D. (Duke)
*Associate Professor of Surgery and Associate Professor
 of Pediatrics* 2419 Alpine Road
- George Addison Silver, III (1946), M.D. (Duke)
Associate Professor of Psychiatry 3910 Dover Road
- Ida Harper Simpson (1959), Ph.D. (North Carolina)
Associate Professor of Sociology 604 Brookview Road
 Chapel Hill, N. C.
- Kathleen J. Simpson (1970), B.S. (Douglass College)
Instructor of Physical Education 1330-3 Ephesus Church Road
 Chapel Hill, N. C.
- William Hays Simpson (1930), Ph.D. (Duke)
Professor of Political Science 1406 Dollar Avenue
- Leroy C. Skinner (1959), M.A. (Maryland)
Associate Professor of Physical Education 416 Argonne Drive
- 181Jens Christian Skou (1970), M.D. (Copenhagen)
Visiting Professor of Physiology
- Theodore A. Slotkin (1971), Ph.D. (Rochester)
Assistant Professor of Pharmacology Apartment 24-H
 2752 Middleton Street
- David Alexander Smith (1962), Ph.D. (Yale)
Associate Professor of Mathematics 2032 West Club Boulevard
- Dwight Moody Smith, Jr. (1965), Ph.D. (Yale)
Professor of New Testament Interpretation 2728 Spencer Street
- Donald S. Smith, II (1961), M.H.A. (Minnesota)
Assistant Professor of Hospital Administration 4167 Deepwood Circle
- Grover C. Smith (1952), Ph.D. (Columbia)
Professor of English 215 W. Woodridge Drive
- Harmon L. Smith (1959), B.D., Ph.D. (Duke)
Associate Professor of Moral Theology 601 East Markham Avenue
- James B. Smith, Jr. (1969), M.M. (Union Theological Seminary)
*Assistant Professor of Music and Director of
 Chapel Music and Choral Conductor* G-12, 1829 Front Street
- Joel Smith (1958), Ph.D. (Northwestern)
Professor of Sociology 2712 Sevier Street
- L. P. Smith (1967), M.S. (Massachusetts Instit. of Tech.)
Instructor in Mathematics 3505 Rugby Road
- Peter Smith (1959), Ph.D. (Canterbury, Cambridge)
Professor of Chemistry 2711 Circle Drive

¹⁸⁰Through 3-31-71.

¹⁸¹Through 1-31-71.

- Ralph E. Smith (1970), Ph.D. (Colorado)
Assistant Professor of Microbiology 922 Green Street
- ¹⁸²Sandra C. Smith (1967), B.S. (North Carolina)
Instructor in Nursing Apartment E-81
 2112 Broad Street
- Thomas Allan Smith (1970), M.D. (Vanderbilt)
Associate in Psychiatry Highland Hospital
 Asheville, N. C.
- Wirt W. Smith (1957), M.D. (Texas)
Associate Professor of Experimental Surgery 3301 Surrey Road
- Joseph T. Sneed (1971), S.J.D. (Harvard)
Professor of Law 2518 Chelsea Circle
- ¹⁸³Ralph E. Snider (1960), D.D.S. (Ohio State)
Associate in Dentistry 1511 Southwood Drive
- Ralph Snyderman (1971), M.D. (State Univ. of New York)
Assistant Professor of Medicine
- George G. Somjen (1963), M.D. (Amsterdam)
Professor of Physiology and Lecturer in the
Department of Psychology 606 Buchanan Boulevard
- Joachim R. Sommer (1957), M.D. (Munich)
Professor of Pathology 2724 Sevier Street
- ¹⁸⁴Joanne G. Southworth (1967), Ph.D. (Med. Coll. of Virginia)
Assistant Professor of Immunology Route 3, Box 156
 Hillsborough, N. C.
- Madison S. Spach (1958), M.D. (Duke)
Professor of Pediatrics 2632 McDowell Street
- Dorothy Spangler (1954), M.A. (North Carolina)
Associate Professor of Physical Education 2729 Brown Avenue
- Bertel M. Sparks (1966), S.J.D. (Michigan)
Professor of Law 1707 Woodburn Road
- Joseph John Spengler (1934), Ph.D. (Ohio State), D.Hu.L., LL.D.
James B. Duke Professor of Economics 2240 Cranford Road
- Alexander Spock (1962), M.D. (Maryland)
Associate Professor of Pediatrics 515 Duluth
- George H. Spooner (1965), Ph.D. (North Carolina)
Assistant Professor of Pathology 318 Severin Street, Box 891
 Chapel Hill, N. C.
- Thomas Spragens (1968), Ph.D. (Duke)
Assistant Professor of Political Science Apartment B-1
 812 Green Street
- Olaf Stackelberg (1963), Ph.D. (Minnesota)
Associate Professor of Mathematics 2101 W. Club Boulevard
- John Staddon (1967), Ph.D. (Harvard)
Associate Professor of Psychology 2719 McDowell Street
- William J. Stambaugh (1961), Ph.D. (Yale)
Associate Professor of Forest Pathology 3211 Sherbon Drive
- D. Keith Stanley, Jr. (1961), Ph.D. (Johns Hopkins)
Associate Professor of Classical Studies C-12 Croasdaile Apartments
- Charles Frank Starmer (1966), Ph.D. (North Carolina)
Associate Professor of Computer Science and Assistant
Professor of Medicine (Computer Science) 1702 Glendale Avenue
- W. K. Stars (1966), M.A. (North Carolina at Chapel Hill)
Assistant Professor of Art 1916 Glendale Avenue
- Eugene Anson Stead, Jr. (1947), M.D. (Emory)
Florence McAlister Professor of Medicine 2122 Campus Drive
- David M. Steegar (1971), M.A. (Ohio State)
Instructor in Romance Languages 5401 Old Well Street
- David C. Steinmetz (1971), Th.D. (Harvard)
Associate Professor of Church History and Doctrine 2517 Wrightwood Avenue

¹⁸²Through 8-31-71.

¹⁸³Through 3-31-71.

¹⁸⁴Through 4-23-70.

- Henry R. Stern (1968), Ph.D. (Northwestern)
Assistant Professor of German 900 West Trinity Avenue
- Karl W. Stevenson (1971), M.D. (Bowman Gray)
Associate in Psychiatry and Associate in Pediatrics 1508 Echo Road
- Lionel Stevenson (1955), Ph.D. (California), F.R.S.L.
James B. Duke Professor of English 3106 Devon Road
- Delford L. Stickel (1962), M.D. (Duke)
Associate Professor of Surgery 3108 Devon Road
- ¹⁸⁵William Frank Stinespring (1936), Ph.D. (Yale)
Professor of Old Testament and Semitics 1107 Watts Street
- ¹⁸⁶Donald E. Stone (1963), Ph.D. (California at Berkeley)
Professor of Botany 2706 Spencer Street
- Peter Stone (1969), Ph.D. (Chicago)
Assistant Professor of Anthropology 124 West Queen Street
- Virginia Stone (1966), Ph.D. (North Carolina)
Professor of Nursing Hillsborough, N. C.
 Apartment 3A
 1829 Front Street
- Boyd R. Strain (1969), Ph.D. (California at Los Angeles)
Associate Professor of Botany 2610 Oberlin Road
- Victor H. Strandberg (1966), Ph.D. (Brown)
Associate Professor of English 2709 Augusta Drive
- ¹⁸⁷Howard A. Strobel (1948), Ph.D. (Brown)
Professor of Chemistry 1119 Woodburn Road
- ¹⁸⁸Henry L. Sublett, Jr. (1962), Ed.D. (Virginia)
Associate Professor of Education 2710 Montgomery Street
- William D. Sudduth (1970), M.S.W. (Minnesota)
Associate in Psychiatric Social Work 2512 North Duke Street
- James Bolling Sullivan (1970), Ph.D. (Texas)
Assistant Professor of Biochemistry 200 Craven Street
 Beaufort, N. C.
- ¹⁸⁹Elizabeth Read Sunderland (1939-42; 1943), Ph.D. (Radcliffe)
Professor of Art 6416 College Station
- John Sutherland (1969), Ph.D. (California at Berkeley)
Assistant Professor of Zoology Route 1, Box 428
 Beaufort, N. C.
- Louis Earl Swanson (1949), A.B. (Hamline)
Associate Professor of Hospital Administration 2418 Wrightwood Avenue
- John Sykes (1968), Ph.D. (Birmingham)
Assistant Professor of Physics 2312 Huron Street
- ¹⁹⁰Geraldine Talarczyk (1968), M.S. (Wisconsin)
Assistant Professor of Nursing Apartment E-62
 2112 Broad Street
- Ingeborg Hildebrand Talton (1968), M.D. (Medical School, Giessen, Germany)
Assistant Professor of Anesthesiology 2406 Tampa Avenue
- Charles Tanford (1960), Ph.D. (Princeton)
James B. Duke Professor of Physical Biochemistry 1430 North Mangum Street
- John TePaske (1967), Ph.D. (Duke)
Professor of History 15 Heath Place
- Marcel Tétel (1960), Ph.D. (Wisconsin)
Professor of Romance Languages 1804 Woodburn Road
- ¹⁹¹William L. Thach (1968), B.A. (College of William & Mary)
Assistant Professor of Naval Science 2304 North Duke Street
- Frances J. Thomas (1970), M.S.N. (North Carolina)
Assistant Professor of Nursing A-10 Camelot Apartments
 Chapel Hill, N. C.
- ¹⁸⁵Retired 8-31-71.
- ¹⁸⁶Sabbatical leave 1971-72.
- ¹⁸⁷Sabbatical leave 1971-72.
- ¹⁸⁸Sabbatical leave, fall 1971-72.
- ¹⁸⁹Leave of absence, fall 1971-72.
- ¹⁹⁰Through 8-31-71.
- ¹⁹¹Through 12-31-70.

- ¹⁹²Norman C. Thomas (1969), Ph.D. (Princeton)
Professor of Political Science 2740 Spencer Street
- ¹⁹³Howard K. Thompson (1962), M.D. (Columbia)
*Associate Professor of Medicine and Associate
 Professor of Biomathematics* 1639 Marion Street
- ¹⁹⁴Kenneth C. Thompson (1970), M.D. (Cincinnati)
Associate in Psychiatry 919 Ferncrest Drive
- Larry W. Thompson (1961), Ph.D. (Florida State)
*Professor of Medical Psychology in the Department of
 Psychiatry and Lecturer in Psychology* 3408 Hope Valley Road
- Lawrence K. Thompson, III (1969), M.D. (Duke)
Assistant Professor of Plastic Surgery 3606 Wateredge Drive
- ¹⁹⁵Richard M. Thompson (1970), M.D. (West Virginia)
Associate in Radiology 1610 Hollywood Street
- Robert L. Thompson (1968), Ed.D. (Duke)
Associate in Community Health Sciences 2618 Pickett Road
- Thomas T. Thompson (1970), M.D. (Med. Coll. of Virginia)
*Assistant Professor of Radiology and Associate
 of Community Health Sciences* 3412 Ogburn Court
- Fredrick L. Thurstone (1967), Ph.D. (North Carolina State)
*Professor of Electrical Engineering and Professor of
 Biomedical Engineering* 2532 Sevier Street
- John Philip Tindall (1966), M.D. (Duke)
Associate Professor of Dermatology 4039 King Charles Road
- ¹⁹⁶Edward A. Tiryakian (1965), Ph.D. (Harvard)
Professor of Sociology 1523 Hermitage Court
- C. Craig Tisher (1969), M.D. (Washington Univ.)
*Assistant Professor of Medicine and
 Assistant Professor of Pathology* 3825 Nottaway Road
- Bert R. Titus (1961), C.P.O.
Assistant Professor of Orthosis and Prosthesis 225 West Woodridge Drive
- Russell F. Tomlinson (1962), Ph.D. (Florida)
*Assistant Professor of Medical Psychology in
 Department of Psychiatry* 401 Holly Street
 Chapel Hill, N. C.
- ¹⁹⁷Elias Torre (1951), Doctor en Filosofía y Letras (Madrid)
Associate Professor of Romance Languages 1121 Anderson Street
- Daniel C. Tosteson (1961), M.D. (Harvard)
James B. Duke Professor of Physiology 321 Burlage Circle
 Chapel Hill, N. C.
- Larry K. Totten (1971), M.D. (Duke)
Associate in Radiology Route 3, Box 177A
 Hillsborough, N. C.
- Ara Y. Tourian (1969), M.D. (Iowa)
Assistant Professor of Medicine 1018 Demerius
- V. G. Trembl (1967), Ph.D. (North Carolina)
Associate Professor of Economics 603 Long Leaf Drive
 Chapel Hill, N. C.
- Richard J. Trilling (1970), Ph.D. (Wisconsin)
Assistant Professor of Political Science 1400 Welcome Circle
- James Nardin Truesdale (1930), Ph.D. (Duke)
Professor of Greek 105 Pinecrest Road
- ¹⁹⁸Benjamin F. Trump (1965), M.D. (Kansas)
Professor of Pathology 1712 Woodburn Road

¹⁹²Through 8-31-71.

¹⁹³Through 7-1-71.

¹⁹⁴Through 6-26-71.

¹⁹⁵Through 6-30-71.

¹⁹⁶Sabbatical leave 1971-72.

¹⁹⁷Deceased 7-10-71.

¹⁹⁸Through 3-1-71.

- 199Vance Tucker (1964), Ph.D. (California at Los Angeles)
Associate Professor of Zoology 412 Swift Avenue
- 200Roger W. Turkington (1968), M.D. (Harvard)
Assistant Professor of Medicine and Assistant
Professor of Biochemistry 2617 Princeton Drive
- Arlin Turner (1953), Ph.D. (Texas)
Professor of English 1115 Woodburn Road
Apartment B-11
- Mary Neville Turner (1971), M.S.N. (Yale)
Assistant Professor of Nursing 1829 Front Street
- Richard Lovejoy Tuthill (1953), Ed.D. (Columbia)
Professor of Economic Geography 2709 Dogwood Road
- 201James B. Twitchell (1970), M.A. (North Carolina)
Temporary Instructor of English 915 West Main Street
Carrboro, N. C.
- Carol Ruth Tyler (1968), M.S.N. (Duke)
Assistant Professor of Nursing Route 7, Box 270
- 202Malcolm P. Tyor (1955), M.D. (Duke)
Professor of Medicine 810 East Forest Hills Boulevard
- Lee Tyrey (1970), Ph.D. (Illinois)
Associate in Obstetrics and Gynecology
and Associate in Anatomy 28J Valley Terrace Apartments
Apartment D-16
- Raymond U (1967), Ph.D. (Kyoto Univ.)
Assistant Professor of Radiology 2112 Broad Street
- 203Stephen Uhalley, Jr. (1968), Ph.D. (California at Berkeley)
Associate Professor of History 2432 Tryon Road
- Luella Jane Uhrhane (1947), M.P.H. (North Carolina)
Associate Professor of Health Education 2712 Circle Drive
- James R. Urbaniak (1969), M.D. (Duke)
Assistant Professor of Orthopaedics D8, 1829 Front Street
Apartment 20
- Senol Utku (1970), M.S., Sc.D. (Massachusetts Instit. of Tech.)
Associate Professor of Civil Engineering 17 Balmoray Court
- 204Javad Vakilzadeh (1968), D.V.M. (Univ. of Tehran)
Assistant Professor of Community Health Sciences 1305 Wildwood Drive
Chapel Hill, N. C.
- Arturo Valenzuela (1970), M.A. (Columbia)
Instructor in Political Science 1706 Shawnee
- William W. Van Alstyne (1964), LL.B. (Stanford)
Professor of Law 1702 Woodburn Road
- Thomas C. Vanaman (1970), Ph.D. (Duke)
Assistant Professor of Microbiology 1007 Minerva Avenue
- Roy Van Varner (1971), M.D. (North Carolina)
Associate in Psychiatry 158 Westbrook
Butner, N. C.
- Vartan Vartanian (1961), M.D. (Cluj, Rumania)
Associate Professor of Anesthesiology 1533 Hermitage Court
- John M. Vernon (1966), Ph.D. (Massachusetts Instit. of Tech.)
Associate Professor of Economics 1001 Gloria Avenue
- Adriaan Verwoerd (1962), M.D. (Amsterdam)
Professor of Psychiatry 4904 Kerley Road
- 205Aleksandar S. Vesic (1964), D.Sc. (Belgrade)
J. A. Jones Professor of Civil Engineering 1722 Duke University Road
- P. Aarne Vesilind (1970), Ph.D. (North Carolina)
Assistant Professor of Civil Engineering 416 Highview Drive
Chapel Hill, N. C.

199Sabbatical leave 1971-72.

200Through 5-29-71.

201Through 5-31-71.

202Leave of absence, 1971-72.

203Through 8-31-71.

204Through 8-31-71.

205Sabbatical leave, spring 1971-72.

- Lois Vick (1967), M.A.T. (Duke)
Lecturer in English 2606 University Drive
- Elia E. Villanueva (1969), M.A. (Duke)
Assistant Professor of Physical Therapy 2041 Cornwallis Road
- Patrick R. Vincent (1954), Ph.D. (Johns Hopkins)
Associate Professor of Romance Languages 1635 Marion Avenue
- ²⁰⁶Humberto Viveros (1970), M.D. (Univ. of Chile)
Visiting Assistant Professor of Biochemistry 2312 Pratt Street
- F. Stephen Vogel (1961), M.D. (Western Reserve)
Professor of Pathology Route 1, Box 307-1
Murphy School Road
- Steven Vogel (1966), Ph.D. (Harvard)
Associate Professor of Zoology 1212 Woodburn Road
- Louis D. Volpp (1967), Ph.D. (Iowa)
Professor of Business Administration 5312 Yardley Terrace
- Howard C. Wachtel (1968), Ph.D. (New York)
Associate Professor of Biomedical Engineering and
Assistant Professor of Physiology 3212 Sherbon Drive
- Joseph A. C. Wadsworth (1965), M.D. (Duke)
Professor of Ophthalmology 1532 Pinecrest Road
- John P. Waggoner, Jr. (1957), B.D. (Duke), B.S. in L.S. (North Carolina)
Associate Professor in the Faculty of Arts and Sciences and
Associate Librarian 2812 Devon Road
- Galen Strohm Wagner (1970), M.D. (Duke)
Associate in Medicine 2518 Indian Trail
- Stephen A. Wainwright (1964), Ph.D. (California at Berkeley)
Associate Professor of Zoology 3812 Dover Road
- ²⁰⁷Salih J. Wakil (1959), Ph.D. (Washington)
Professor of Biochemistry 2527 Sevier Street
- ²⁰⁸Elizabeth Humphrey Walker (1966), M.A. (Emory)
Temporary Instructor in Romance Languages Campus Apartment 14
Elf Street
- Preston A. Walker (1967), M.D. (Med. Coll. of South Carolina)
Assistant Professor of Psychiatry 5207 Hawkesbury Lane
Raleigh, N. C.
- William D. Walker (1971), Ph.D. (Cornell)
Professor of Physics 1024 Gloria Avenue
- Andrew G. Wallace (1964), M.D. (Duke)
Professor of Medicine and Assistant Professor of Physiology 3413 Rugby Road
- Michael A. Wallach (1962), Ph.D. (Harvard)
Professor of Psychology 2406 North Duke Street
- Abe Walston, II (1969), M.D., LL.B. (Duke)
Assistant Professor of Medicine 622 Starmont Drive
- Richard L. Walter (1962), Ph.D. (Notre Dame)
Associate Professor of Physics 1614 Woodburn Road
- Hsioh Shan Wang (1965), M.B. (National Taiwan Univ. Med. Coll.)
Associate Professor of Psychiatry 2832 McDowell Street
- Lily Pan Wang (1970), M.S.W. (North Carolina)
Associate in Psychiatric Social Work 2832 McDowell Street
- Paul P. Wang (1968), Ph.D. (Ohio State)
Associate Professor of Electrical Engineering 203 Landsbury Road
- Calvin Lucian Ward (1952), Ph.D. (Texas)
Associate Professor of Zoology 1726 Duke University Road
- Frances Ward (1969), Ph.D. (Brown)
Assistant Professor of Immunology and Assistant Professor
of Experimental Surgery 424 Carolina Circle

²⁰⁶Through 3-31-71.

²⁰⁷Through 8-31-71.

²⁰⁸Through 5-31-71.

- Bruce W. Wardropper (1962), Ph.D. (Pennsylvania)
William H. Wannamaker Professor of Romance Languages 3443 Rugby Road
- Seth L. Warner (1955), Ph.D. (Harvard)
Professor of Mathematics 2406 Wrightwood Avenue
- ²⁰⁹Richard Lyness Watson, Jr. (1939), Ph.D. (Yale)
Professor of History 109 Pinecrest Road
- Robert E. Webster (1970), Ph.D. (Duke)
Associate Professor of Biochemistry 3720 Saint Marks Road
- ²¹⁰E. Roy Weintraub (1970), Ph.D. (Pennsylvania)
Assistant Professor of Economics 2902 Gretmar Drive
- Morris Weisfeld (1967), Ph.D. (Yale)
Professor of Mathematics 3818 Darby Road
- John C. Weistart (1969), J.D. (Duke)
Assistant Professor of Law Apartment 4
 2100 House Avenue
- Henry Weitz (1950), Ed.D. (Rutgers)
Professor of Education 2716 Circle Drive
- Bruce A. Wells (1964), M.S.E.E. (Oregon State)
Associate Professor of Electrical Engineering 2729 Montgomery Street
- Richard L. Wells (1962), Ph.D. (Indiana)
Associate Professor of Chemistry 3313 Randolph Road
- ²¹¹Samuel A. Wells, Jr. (1970), M.D. (Emory)
Assistant Professor of Surgery
- Paul Welsh (1948), Ph.D. (Cornell)
Professor of Philosophy 2749 Dogwood Road
- ²¹²Daniel P. Werner (1968), Ph.D. (Michigan)
Assistant Professor of Mechanical Engineering 3812 Dover Road
- Martha L. Wertz (1960), M.S.W. (Tulane)
Assistant Professor of Psychiatric Social Work 2717 Augusta Drive
- ²¹³Joel J. West (1967), M.D. (Northwestern)
Assistant Professor of Medicine 2716 Augusta Drive
- Joseph Cable Wetherby (1947), M.A. (Wayne)
Associate Professor of English 2604 Sevier Street
- Robert Whalen (1961), M.D. (Cornell)
Associate Professor of Medicine 3509 Westover Road
- Alan D. Whanger (1970), M.D. (Duke)
Associate in Psychiatry 3316 Dixon Road
- Robert W. Wheat (1958), Ph.D. (Washington)
Associate Professor of Microbiology
and Assistant Professor of Biochemistry 2720 Montgomery Street
- Charles W. White (1970), Ph.D. (Stanford)
Assistant Professor of Psychology 2514 Nation Avenue
- Fred M. White (1959), M.F. (Duke)
Assistant Professor of Silviculture 3323 Rolling Hills Road
- Richard Alan White (1963), Ph.D. (Michigan)
Associate Professor of Botany 608 Duluth Street
- Suzanne White (1970), M.A. (California at Los Angeles)
Instructor in Physical Education Apartment K2B
 1500 Duke University Road
- Willamay Whitner (1969), Ed.D. (Columbia)
Associate Professor in Nursing Research 122 Landsbury Road
- Frances K. Widmann (1971), M.D. (Western Reserve)
Assistant Professor of Pathology 1504 Cumberland Road
 Chapel Hill, N. C.

²⁰⁹Sabbatical leave, fall 1971-72.

²¹⁰Leave of absence 1971-72.

²¹¹Leave of absence 1970-72.

²¹²Through 8-31-71.

²¹³Through 9-12-70.

- ²¹⁴Jens Otto Wieth (1970), M.D. (Arttus University)
Visiting Associate Professor of Physiology Apartment 7-A
 610 LaSalle Street
- Karl Milton Wilbur (1946), Ph.D. (Pennsylvania)
James B. Duke Professor of Zoology 2404 Bruton Road
- Robert L. Wilbur (1957), Ph.D. (Michigan)
Professor of Botany 2613 Stuart Drive
- Pelham Wilder, Jr. (1949), Ph.D. (Harvard)
Professor of Chemistry and Professor of Pharmacology
in Department of Physiology and Pharmacology 2514 Wrightwood Avenue
- Catherine M. Wilfert (1969), M.D. (Harvard)
Assistant Professor of Pediatrics and Assistant
Professor of Virology in the Department of
Microbiology and Immunology 1312 Georgia Avenue
- ²¹⁵Albert E. Wilhelm (1970), M.A. (North Carolina)
Temporary Instructor of English Route 6, Box 141
 Chapel Hill, N. C.
- Robert Henry Wilkins (1968), M.D. (Pittsburgh)
Assistant Professor of Neurosurgery in Department of Surgery 3726 Bentley Drive
- Robert H. Wilkinson, Jr. (1967), M.D. (Washington Univ.)
Associate Professor of Radiology 3519 Courtland Drive
- William E. Wilkinson (1967), Ph.D. (North Carolina)
Assistant Professor of Mathematics P. O. Box 836
 Chapel Hill, N. C.
- Hilda Pope Willett (1948), Ph.D. (Duke)
Professor of Bacteriology 901 Wakestone Court
 Raleigh, N. C.
- George Walton Williams (1957), Ph.D. (Virginia)
Professor of English 6 Sylvan Road
- William Hailey Willis (1963), Ph.D. (Yale)
Professor of Greek in Department of Classical Studies 1419 Dollar Avenue
- James F. Wilson (1967), Ph.D. (Ohio State)
Associate Professor of Civil Engineering 3523 Racine Street
- James W. Wilson (1969), Ph.D. (Kentucky)
Associate in Pathology 2711 Oberlin Drive
- John Wilson (1968), D.Phil. (Oxford)
Associate Professor of Sociology and Anthropology 3130 Pickett Road
- Robert L. Wilson (1970), Ph.D. (Northwestern)
Research Professor of Church and Society 237 Monticello Avenue
- Ruby L. Wilson (1959-1970; 1971), Ed.D. (Duke)
Professor of Nursing 2436 Tryon Road
- Thomas G. Wilson (1959), Sc.D. (Harvard)
Professor of Electrical Engineering 2721 Sevier Street
- William P. Wilson (1961), M.D. (Duke)
Professor of Psychiatry 1209 Virginia Avenue
- Cliff W. Wing, Jr. (1965), Ph.D. (Tulane)
Associate Professor of Psychology 2722 Spencer Street
- Orval Wintermute (1958), Ph.D. (Johns Hopkins)
Associate Professor of Religion and Lecturer in
Old Testament 1103 North Duke Street
- Paul C. Winther (1970), M.A. (Michigan State)
Lecturer in Sociology and Anthropology 129 North Hassel Street
 Hillsborough, N. C.
- Loren Ralph Withers (1949), M.S. (Juilliard)
Associate Professor of Music 2741 Dogwood Road
- Ronald G. Witt (1971), Ph.D. (Harvard)
Associate Professor of History 802 Onslow Street
- Benjamin Wittels (1961), M.D. (Minnesota)
Professor of Pathology 2308 Prince Street

²¹⁴Through 5-31-71.

²¹⁵Through 5-31-71.

- Myron L. Wolbarsht (1968), Ph.D. (Cornell)
*Professor of Ophthalmology; Associate Professor of
 Physiology; Lecturer in Biomedical Engineering; and
 Lecturer in Psychology* 1435 Acadia Street
- Kai Tak Wong (1971), M.Sc. (Illinois)
Assistant Professor of Mathematics 1913 Morehead
- Max Atkin Woodbury (1966), Ph.D. (Michigan)
*Professor of Biomathematics (Community Health
 Sciences) and Professor of Computer Science* 4008 Bristol Road
- Barnes Woodhall (1937-43; 1945), M.D. (Johns Hopkins)
James B. Duke Professor of Neurosurgery 4006 Dover Road
- A. Lorraine Woodyard (1954), M.Ed. (North Carolina at Greensboro)
Associate Professor of Physical Education 880 Louise Circle
- Boyd T. Worde (1958), M.D. (Tennessee)
Associate Professor of Radiology 2512 Sevier Street
- ²¹⁶Samuel N. Workman (1967), M.D. (Med. Coll. of South Carolina)
Assistant Professor of Psychiatry Highland Hospital
 Asheville, N. C.
- Paul M. Wortman (1967), Ph.D. (Carnegie-Mellon)
Assistant Professor of Psychology Route 1, Box 313A
 Linden Road
- Julia Ann Hedgepeth Wray (1955), M.F.A. (North Carolina at Greensboro)
Assistant Professor of Physical Education 911 Carver Street
- Donald Wright (1967), Ph.D. (Purdue)
Assistant Professor of Mechanical Engineering Route 2
 Highland Drive
- James E. Wuenscher (1970), Ph.D. (Wisconsin)
Assistant Professor of Forestry Route 2, Box 353
 Guess Road
- James B. Wyngaarden (1956-65; 1967), M.D. (Michigan)
Hanes Professor of Medicine 707 Morehead Avenue
- David O. Yandle (1967), Ph.D. (North Carolina State)
Associate Professor of Forest Mathematics 2400 Tampa Avenue
- William E. Yarger (1971), M.D. (Baylor)
Assistant Professor of Medicine 3406 Cambridge Road
- William P. Yohe (1958), Ph.D. (Michigan)
Professor of Economics 3310 Pinafore Drive
- Charles R. Young (1954), Ph.D. (Cornell)
Professor of History 2929 Welcome Drive
- David L. Young (1966), M.D. (Texas)
Associate Professor of Medicine 3504 Stoneybrook Drive
- Franklin W. Young (1968), Ph.D. (Duke)
*Amos R. Kearns Professor of New Testament and
 Patristic Studies* 132 Pinecrest Road
- ²¹⁷Helen Rose Young (1957), M.S. (William & Mary)
Assistant Professor of Nursing 5400 Newhall Road
- Paul Young (1956), M.A. (Illinois)
Professor in the Faculty of Arts and Sciences 1110 Shepherd Street
- W. Glenn Young, Jr. (1954), M.D. (Duke)
Professor of Surgery 3718 Eton Road
- Robert E. Zipf, Jr. (1971), M.D. (Ohio State)
Associate in Pathology 3919 Brixton Lane
- William W. K. Zung (1966), M.D. (Texas)
Associate Professor of Psychiatry 1816 Woodburn Road
- Peter Zwadyk, Jr. (1971), Ph.D. (Iowa)
Assistant Professor of Pathology 4729 Stafford Drive
- Hendrick J. Zweerink (1970), Ph.D. (Cornell)
Assistant Professor of Microbiology 2309 Prince Street

²¹⁶Through 5-15-71.

²¹⁷Sabbatical leave, spring 1971-72.

Adjunct Faculty and Part-Time Instructional Staff

Kenneth C. Abernethy (1969), M.A. (Duke) <i>Part-time Instructor, Mathematics</i>	2625 Lombard Avenue Apartment 2
Elizabeth H. Agnew (1971), M.A. (Duke) <i>Part-time Instructor, Mathematics</i>	2510 Vesson Avenue
Paul Wesley Aitken (1964), Th.M. (Duke) <i>Chaplain and Part-Time Assistant Professor of Clinical Pastoral Education</i>	2909 Harriman Drive Apartment 28
Elaine E. Alexander (1971), M.A. (Duke) <i>Part-time Instructor, Mathematics</i>	301 Swift Avenue
Kathleen May Ashley (1970), M.A. (Duke) <i>Graduate Tutor, English</i>	2720 Brown Avenue
Anthony Barkauskas (1970), M.A. (Duke) <i>Part-time Instructor, Mathematics</i>	863 Louise Circle
Ethel L. Beach (1970), A.B. (Univ. Libre de Brux.) <i>Part-time Instructor, Romance Languages</i>	1011 Dacian Avenue
Stephen Beach (1968), A.B. (Stanford) <i>Part-time Instructor, Sociology and Anthropology</i>	309 East Edwards Street
Bonnie Beck (1970), M.S. (North Carolina at Greensboro) <i>Part-time Instructor, Physical Education</i>	2411 New Orleans Greensboro, N. C.
Eleanor F. Branch (1970), M.A. (Duke) <i>Part-time Lecturer, Physical Therapy</i>	Route 8, Box 117
Hubert J. Brown (1969) <i>Part-time Instructor, Physical Education</i>	510 Duluth Street
Larry George Brunner (1969), M.A. (Duke) <i>Graduate Tutor, English</i>	1712 West Roxboro Road
Stephen G. Bunker (1971), M.A. (Duke) <i>Part-time Instructor, Sociology and Anthropology</i>	314 Dacian Street
Harry S. Butler (1970), M.A. (Duke) <i>Graduate Tutor, English</i>	A-307 Bristol Court Apts.
Susan M. Butler (1970), M.A. (Duke) <i>Graduate Tutor, English</i>	A-307 Bristol Court Apts. Box 1027
John W. Carlton (1955), Ph.D. (Duke) <i>Adjunct Professor of Preaching, Divinity</i>	Wake Forest, N. C.
Elizabeth Carney (1970), B.A. (Smith) <i>Instructional Assistant, Classical Studies</i>	1102 Monmouth Avenue
Edgar W. Clark (1963), Ph.D. (California) <i>Adjunct Associate Professor of Forest Entomology</i>	Route 1, Box 62 Cary, N. C.
Walter Eugene Cleary (1970), M.A.T. (North Carolina) <i>Part-time Instructor, Assistant Track Coach, and Assistant Football Coach</i>	3329 Rolling Hill Road
George K. Coffin (1961), Ph.D. (Duke) <i>Adjunct Assistant Professor, Civil Engineering</i>	3929 Kelley Drive
Ralph A. Cohen (1970), M.A. (Duke) <i>Graduate Tutor, English</i>	Apartment L-2 811 Demerius Street
Elizabeth Colford (1970), M.A. (Duke) <i>Part-time Instructor, Romance Languages</i>	Apartment 12 301 Swift Avenue
Philip Robert Cousin (1969), S.T.B. (Boston) <i>Visiting Lecturer, Divinity School</i>	919 Jerome Road
David L. Cozart (1971), B.S. (Guilford) <i>Part-time Instructor, Mathematics</i>	612 West Markham Avenue
Peter Glenn Crow (1970), M.A. (Florida State) <i>Graduate Tutor, English</i>	1017 Gloria Avenue

*See also Medical School, page 65:

- Howard Max Crowder (1971), A.B. (Duke)
Trainer of Basketball and Football and Part-time Instructor, Physical Education Duke Athletic Department
 Route 7
- Chicita F. Culberson (1971), Ph.D. (Duke)
Senior Research Associate and Lecturer in Botany George King Road
- Richard Alan Culpepper (1971), M.Div. (Southern Baptist Theological Seminary)
Instructional Assistant, Religion 1809 Morehead
- Junius A. Davis (1968), Ph.D. (Columbia)
Adjunct Professor, Education 405 Holly Hill Lane
 Chapel Hill, N. C.
- Alene Delgado (1971), M.A. (Duke)
Part-time Instructor, Romance Languages Apartment 27
 301 Swift Avenue
- John C. Detwiler (1966), Th.M. (Duke)
Assistant Chaplain Supervisor, Duke Medical Center, and Instructor in Pastoral Care, Divinity 2733 Spencer Street
- Arlene DiCecco (1970), "License" (Royal Academy of Music)
Part-time Staff Associate in Music 5418 Beaumont Drive
- William W. Dickson (1971), M.A. (Duke)
Graduate Tutor, English Apartment 4-C
 5222 Kerley Road
- Edward Dirlam (1971), B.S. (Stetson Univ.)
Part-time Instructor, Chemistry 5901 Craig Road
- John M. Dunaway (1969), M.A. (Duke)
Part-time Instructor, Romance Languages 103 East Club Boulevard
- John R. Dunlop (1971), B.A. (Santa Clara)
Part-time Instructor, Classical Studies Apartment 105
 312 Buchanan Boulevard
- Daniel L. Durway (1970), B.D. (Austin Presbyterian Theological Seminary)
Part-time Instructor, Religion 622 Morreene Road
- Joanne Headstream Ecke (1970), M.A.T. (Duke)
Graduate Tutor, English Apt. E-7, 3600 Tremont Drive
- Frances C. Edmonds (1970), M.A. (Duke)
Part-time Instructor, Mathematics Apartment 9E
 1505 Duke University Road
- Paul Elliott (1971), B.S. (Duke)
Part-time Instructor, Computer Science Program Apartment 4-A
 1700 Chapel Hill Road
- E. Carol Ellis (1971), B.S. (Auburn)
Part-time Instructor, Chemistry Apartment 4
 718 Underwood Avenue
- Lynda L. Emerson (1970), A.B. (Vassar)
Part-time Instructor, Mathematics 1417 Watts Street
- Bonnie Epperson (1971), B.A. (Park College)
Part-time Instructor, Chemistry 36 Howe Street
- Marilyn T. Erickson (1968), Ph.D. (Washington)
Part-time Visiting Associate Professor in Education 2601 Tanglewood Drive
- Sally Fairfax (1971), M.S. (Duke)
Preceptor, Political Science 227 Dacian Avenue
- Joseph James Falcone (1971), B.A. (Duke)
Part-time Instructor, Physical Education 1402 Woodburn Road
- Bruce Fitzgerald (1971), M.S.I.E. (Georgia Instit. of Tech.)
Part-time Instructor, Economics 403½ North Gregson Street
- Steven Ford (1971), B.A. (South Carolina)
Part-time Instructor, Romance Languages Westover Park Apartment B-4
 Elf Street
- Gerald D. Frank (1970), S.M.M. (Union Theological Seminary)
Staff Associate, Assistant to Director of Chapel Music and Divinity School Organist, Music 1902½ Shelton Avenue
- Kenneth D. Gailey (1970), B.A. (Maine)
Part-time Instructor, Chemistry 1119 Woodburn Road
- Brian G. Gentle (1971), M.A. (Columbia)
Graduate Assistant in Church History, Divinity Spring Hope, N. C.
- Frank Gerstle, Jr. (1970), S.M. (Massachusetts Instit. of Tech.)
Part-time Instructor, Mechanical Engineering 2727 Brown Avenue

- Lawrence Gestaut (1971), B.A. (Wake Forest College) Apartment 9-H
Part-time Instructor, Chemistry 1505 Duke University Road
- William H. Gilbert (1970), M.A. (Duke) 1016 Gloria Avenue
Graduate Tutor, English
- Roy A. Gilchrist (1968), M.P.H. (North Carolina at Chapel Hill) 1611 Duke University Road
Part-time Instructor, Physical Education
- Robert Gilpin (1971), M.A. (Duke) 712 Churchill Drive
Part-time Instructor, History Chapel Hill, N. C.
- Judith Gogolewski (1971), Ph.D. (Vanderbilt) 1317 Westfield Avenue
Part-time Lecturer, Slavic Languages and Literatures Raleigh, N. C.
- Lawrence C. Goodwyn (1971), Ph.D. (Texas)
Adjunct Assistant Professor, History and Senior
Research Associate in the Center for Southern Studies 23 Scott Place
- John W. Gordon (1971), M.A. (Duke)
Instructional Assistant, History 1405 Vickers Avenue
- Valerie Greenberg (1971), M.Ed. (Boston)
Part-time Instructor, Germanic Languages and Literature 13 Ashley Road
- Frederica Crowell Harrison (1970), M.S.W. (Atlanta) Route 3
Associate (part time), Department of Psychiatry 535 Tuggle Street
- Ingrid U. Hartwig (1969), B.A. (Hohere Wirtschaftsschule)
Part-time Instructor, Germanic Languages
and Literature 505 Brighton Street
- Charles J. Haulk (1971), M.A. (Duke)
Part-time Instructor, Economics 809 Parker Street
- Jerry S. Herbert (1971), B.A. (University of Redlands)
Preceptor, Political Science 1408 Alabama Avenue
- Scott Herman-Giddens (1970)
Part-time Lecturer, Computer Science and Systems
Programmer in Division of Pediatric Cardiology in
the Pediatrics Department 12 Cobb Terrace
 Chapel Hill, N. C.
- David C. Hester (1971), M.Div. (Bangor Theological Seminary) Apartment 12-F
Graduate Assistant in New Testament Greek, Divinity 600-2 LaSalle Street
- Dorothy K. Heyman (1971), M.S.W. (Pennsylvania)
Part-time Assistant Professor, Psychiatric Social Work 1216 Woodburn Road
- Samuel Middleton Hines, Jr. (1970), M.A. (Duke)
Part-time Instructor, Political Science 3708 Knollwood Drive
- Charles S. Hodges, Jr. (1963), Ph.D. (Georgia) 2012 Nancy Ann Drive
Adjunct Associate Professor, Forest Pathology Raleigh, N. C.
- James E. Holloway, Jr. (1971), A.M. (Duke)
Part-time Instructor, Romance Languages Alsbaugh House
- John Holsberry (1971), M.A. (Florida State) Apartment P-1
Graduate Tutor, English 820 Demerius Street
- Charles Howe (1971), B.S. (Richmond)
Part-time Instructor, Chemistry 2112 Elba Street
- Richard H. Hudson (1969), Ph.D. (Duke)
Part-time Instructor, Mathematics 938 Lambeth Circle
- Kaye V. Hughes (1971), M.A. (North Carolina) A3A Cameron Court Apartments
Part-time Instructor, Romance Languages Raleigh, N. C.
- Carol C. Ingram (1971), M.A. (Chicago) 1917 South Lake Shore Drive
Part-time Assistant Professor, Nursing Chapel Hill, N. C.
- Jacqueline Ingram (1967), B.A. (Oklahoma) 601 Oteys Road
Technical Assistant (part-time), Geology Chapel Hill, N. C.
- Jack Edward Jacobsen (1971), B.S. (Georgia Instit. of Tech.)
Part-time Instructor, Economics 203 Watts Street
- Richard M. Johnson (1971), B.A. (Texas Christian)
Graduate Tutor, English Apartment 1
 707 Louise Circle

- Jon Keates (1970), M.A. (Duke)
Graduate Tutor, English 1106 Alabama Avenue
- John Thomas Kelly (1970), M.A. (Case-Western Reserve)
Graduate Tutor, English 418 Anderson
- John G. Kennedy (1971), M.A. (Duke)
Graduate Tutor, English 888 Louise Circle
- Rebecca Kinnamon (1971), M.A.T. (Duke)
Graduate Tutor, English Apartment 21-N
 2729 Brown Avenue
- Lawrence O. Kline (1971), M.A. (New York Univ.)
Graduate Assistant in Church History, Divinity 1112 North Gregson Street
- Maurine Boie LaBarre (1961), M.S.W. (Bryn Mawr)
Part-time Associate Professor, Psychiatric Social Work Route 1
 Mt. Sinai Road
- Musia Lakin (1969), M.A. (Chicago)
Adjunct Instructor, Psychology 2709 McDowell Street
- Jeffrey S. Lazarus (1971), B.S. (Duke)
Part-time Lecturer in Computer Science and Systems Analyst, Institutional Data Processing Apartment 2
 1935 Southwood Avenue
- James Lee (1971), M.A. (Duke)
Preceptor, Political Science 813 Buchanan Boulevard
- David Lindquist (1971), A.B. (Drury College)
Preceptor, Political Science 1222 Arnette Avenue
- James C. Little (1971), B.D. (Duke)
Part-time Lecturer, Religion 1207 Washington Street
- E. Morgan Longbotham (1968), M.A.L.S. (Wesleyan)
Graduate Tutor, English 3600 Tremont Drive
- Jo Ann Lutz (1971), M.A. (Duke)
Part-time Instructor, Mathematics 913 North Buchanan Boulevard
- Ian G. MacIntyre (1970), Ph.D. (McGill)
Adjunct Assistant Professor, Geology Smithsonian Institution
 Washington, D. C.
- Janice Madden (1971), M.A. (Duke)
Part-time Instructor, Economics 20F Valley Terrace
- David H. Madsen (1970), B.A. (Brigham Young)
Part-time Instructor, Romance Languages 902 Dacian Avenue
- Adeline McCall (1962), M.A. (North Carolina)
Visiting Part-time Instructor, Music Rocky Ridge Road
 Chapel Hill, N. C.
- James B. Martin (1970), A.B. (Duke)
Assistant Instructor in Physical Education and Assistant Manager, Golf Course 914 Monmouth Avenue
- Richard M. Martin (1971), M.Div. (Duke)
Graduate Assistant in Christian Theology, Divinity Apartment 4B
 1600 Anderson Street
- Anthony S. Maurice (1971)
Part-time Instructor, Romance Languages 5C Towne House Apartments
 Chapel Hill, N. C.
- Louis J. Metz (1963), Ph.D. (Duke)
Adjunct Associate Professor, Forestry 928 Kathryn Street
 Cary, N. C.
- Kathleen M. Murphy (1971), M.A. (Duke)
Graduate Tutor, English Apartment 28
 301 Swift Avenue
- M. Wilson Nesbitt, Jr. (1957), B.D. (Duke), D.D.
Adjunct Professor of the Work of the Rural Church 1609 Peace Street
- Thomas C. Niemann (1969), M.A. (Duke)
Graduate Tutor, English 2214 Elba Street
- David Arthur Nordquest (1970), M.A. (Duke)
Preceptor, Political Science 703 West Markham Avenue
- Margaret Norris (1971), M.A. (Stanford)
Part-time Instructor, Romance Languages Apartment 2H
 2724 Middleton Street
- W. Roger Nutt (1969), Ph.D. (Duke)
Part-time Instructor, Chemistry 1000 North Duke Street

- Marion W. O'Neill (1971), Ph.D. (Brown)
Part-time Instructor, Romance Languages 702 North Buchanan Boulevard
- Orondo J. Opeyo (1971), B.A. (Wartburg Coll.)
Part-time Instructor, Swahili 210 Purefoy Road
 Chapel Hill, N. C.
- Timothy G. O'Rourke (1971), B.A. (Pittsburgh)
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Circulation Assistant

Indian Spring Road
Chapel Hill, N. C.

Annie C. Walker
Assistant, Order Department

2527 Wilson Street

Carole McKnight Wells, B.A.
Library Assistant
Betty Shen Wu, M.A. in L.S.
Library Assistant
Chief Cataloguer

4-A 1803 House Avenue

2724 Erwin Road
610 Massey Avenue

Medical Center Library

G. S. Terence Cavanagh, B.L.S.
Director, and Curator of Trent Collection
Warren P. Bird, M.S.
Associate Director
Constance M. Tatum, M.S.
Chief Cataloguer
Mary Ann Brown, M.S.
Chief of Reader Services
Eula Wheeler, M.S.
Acquisitions Librarian
Kathryn Kruse, M.A.
Reference Librarian
Susan C. Smith, B.S., M.F.A.
Assistant Curator, Trent Collection
Janet Sawyer, B.A.
Circulation Assistant
Judy Woodburn, M.S.
Serials Librarian

Apartment F-8
1200 Leon Street
Apartment 10
2007 House Avenue

610 Massey Avenue
Apartment 2
106 Buchanan Boulevard
28 Mt. Bolus Road
Chapel Hill, N. C.
Apartment 6-C
1600 Anderson Street

3204 Hope Valley Road
Apartment A-8
1200 Leon Street
Apartment D-5
3600 Tremont Street

Medical Sciences Branch

Virginia DeTurk, B.A.
Librarian

114 Newell Street

Nursing School Library

Mary Horres, M.S.
Librarian

55 Circle Drive
Chapel Hill, N. C.

Physics-Mathematics Library

Mary Cox, B.A.
Librarian

1913 University Drive

Government and Administrative and Instructional Staff

The University Trustees		36	
Trustees Emeriti		16	
General Administration		20	
Faculty and Administrators Emeriti		101	
*Instructional Staff		1,245	
Professors	370		
Associate Professors	241		
Assistant Professors	308		
Associates	85		
Instructors	27		
Lecturers	7		
Visiting Professors and Lecturers	22		
Professors	5		
Associate Professors	4		
Assistant Professors	11		
Instructors	1		
Lecturers	1		
Part-time:			
Adjunct Faculty and Instructional Staff (except Medical School)		173	
Professors	7		
Associate Professors	10		
Assistant Professors	7		
Associates	5		
Instructors	75		
Lecturers	9		
Graduate Assistants, Tutors, and Preceptors	60		
Adjunct Faculty, Medical School		11	
Research Associates			118
Clinical Faculty, Medical School			104
†Educational Administration			20
‡Business Administration			28
§Institutional Advancement			36
**Student Affairs			21
††Other Officers and Staff			96
Art	3		
Athletics	28		
Audio Visual Education-Medical Center	10		
Duke University Press	7		
Food Services	19		
House Counselors, Woman's College	15		
Music	4		
University Stores	10		
The University Libraries			160
			<hr/>
	TOTAL		2,000

*Includes 9 officers listed with General Administration.

†Does not include 9 listed with General Administration; 36 with academic rank listed with Instructional Staff; and 1 listed with Faculty Emeriti.

‡Does not include 5 listed with General Administration.

§Does not include 1 listed with General Administration.

**Does not include 5 with academic rank listed with Instructional Staff.

††Does not include 13 with academic rank listed with Instructional Staff.

‡‡Does not include 3 with academic rank listed with Instructional Staff.

Appendix

Government

1. THE INDENTURE OF TRUST BY WHICH THE UNIVERSITY WAS CREATED

Among the provisions of James B. Duke's Indenture of Trust was an educational institution to be known as Duke University, to the building and support of which he made provision at the time of execution of the Indenture and later by additions thereto by the operation of his Will. In respect to Duke University the Indenture contains the following provisions:

1. (In Article FOURTH) The Trustees hereunder are hereby authorized and directed to expend as soon as reasonably may be not exceeding Six Million Dollars of the corpus of this trust in establishing at a location to be selected by them within the State of North Carolina an institution of learning to be known as Duke University, for such purpose to acquire such land and erect and equip thereon such buildings according to such plans as the Trustees may in their judgment deem necessary and adopt and approve for the purpose to cause to be formed under the laws of such state as the Trustees may select for the purpose a corporation adequately empowered to own and operate such properties under the name of Duke University as an institution of learning according to the true intent hereof, and convey to such corporation when formed the said lands, buildings and equipment upon such terms and conditions as that such corporation may use the same only for such purposes of such universities and upon the same ceasing to be so used then the same shall forthwith revert and belong to the Trustees of this trust as and become a part of the corpus of this trust for all the purposes thereof.

However, should the name of Trinity College, located at Durham, North Carolina, a body politic and incorporate, within three months from the date hereof (or such further time as the Trustees hereof may allow) be changed to Duke Uni-

versity, then, in lieu of the foregoing provisions of this division "FOURTH" of the Indenture as a memorial to his father, Washington Duke, who spent his life in Durham and whose gifts, together with those of Benjamin N. Duke, the brother of the party of the first part and of other members of the Duke family, have so largely contributed toward making possible Trinity College at that place, he directs that the Trustees shall expend of the corpus of this trust as soon as reasonably may be a sum not exceeding Six Million Dollars in expanding and extending said University, acquiring and improving such lands, and erecting, removing, remodeling and equipping such buildings, according to such plans, as the Trustees may adopt and approve for such purpose to the end that said Duke University may eventually include Trinity College as its undergraduate department for men, a School of Religious Training, a School for Training Teachers, a School of Chemistry, a Law School, Co-ordinate College for Women, a School of Business Administration, a Graduate School of Arts and Sciences, a Medical School and an Engineering School, as and when funds are available.

II. (In Article FIFTH) Thirty-two per cent of said net amount not retained as aforesaid for addition to the corpus of this trust shall be paid to that Duke University for which expenditures of the corpus of the trust shall have been made by the Trustees under the "Fourth" division of this Indenture so long as its name shall be Duke University and it shall not be operated for private gain, to be utilized by its Board of Trustees, in defraying its administration and operating expenses, increasing and improving its facilities and equipment, the erection and enlargement of buildings and the acquisition of additional acreage for it, adding to its endowment or in such other manner for it as the Board of Trustees of said institution may from time to time deem to be of its best interests, provided that in case such institutions shall incur any expense of liability beyond provisions already in sight to meet same, or in the judgment of the Trustees under this Indenture be not operated in a manner calculated to achieve the results intended hereby the Trustees under this Indenture may withhold the whole or any part of such percentage from said institution so long as such character of expense or liabilities or operation shall continue, such amounts so withheld to be in whole or in part either accumulated and applied to the purposes of such University in any future year or years, or utilized for the other objects of this Indenture, or added to the corpus of this trust for the purpose of increasing the principal of the trust estate, as the Trustees may determine.

III. (In Article SEVENTH) I have selected Duke University as one of the principal objects of this trust because I recognize that education, when conducted along sane and practical, as opposed to dogmatic and theoretical, lines, is, next to religion, the greatest civilizing influence. I request that this institution secure for its officers, trustees, and faculty, men of such outstanding character, ability, and vision as will insure its attaining and maintaining a place of real leadership in the educational world, and that great care and discrimination be exercised in admitting as students only those whose previous records show a character, determination, and application evincing a wholesome and real ambition for life. And I advise that the courses at this institution be arranged, first, with special reference to the training of preachers, teachers, lawyers and physicians, because these are most in the public eye, and by precept and example can do most to uplift mankind, and

second, to instruction in chemistry, economics, and history, especially the lives of the great of earth, because I believe that such subjects will most help to develop our resources, increase our wisdom and promote human happiness.

IV. (In Article THIRD) as respects any year or years and any purpose or purposes for which this trust is created (except the payments hereinafter directed to be made to Duke University) the Trustees in their uncontrolled discretion may withhold the whole or any part of said incomes, revenues and profits which would otherwise be distributed under the "Fifth" division hereof, and either (1) accumulate the whole or any part of the amount so withheld for expenditures (which the Trustees are hereby authorized to make thereof) for the same purpose in any future year or years, or (2) add the whole or any part of the amounts so withheld to the corpus or the trust, or (3) pay, apply and distribute the whole or any part of said amounts to and for the benefit of any one or more of the other purposes of this trust, or (4) pay, apply and distribute the whole or any part of said amounts to or for the benefit of any such like charitable, religious or educational purpose within the State of North Carolina or the State of South Carolina, or any such like charitable hospital purpose which shall be selected therefor by Trustees called for the purpose, complete authority and discretion in and for such selection and utilization being hereby given the Trustees in the premises.

2. THE CHARTER OF THE UNIVERSITY

Section 1. That A. P. Tyer, J. H. Southgate, B. N. Duke, G. A. Oglesby, V. Ballard, J. A. Long, J. F. Burton, J. N. Cole, F. A. Bishop, J. G. Brown, C. W. Toms, J. W. Alspaugh, W. R. Odell, J. A. Gray, F. Stikeleather, Kope Elias, S. B. Turrentine, P. H. Hanes, T. F. Marr, G. W. Flowers, M. A. Smith, R. H. Parker, W. J. Montgomery, F. M. Simmons, O. W. Carr, R. A. Mayer, N. M. Journey, Dred Peacock, B. B. Nicholson, W. G. Bradsher, E. T. White, T. N. Ivey, J. B. Hurley, R. L. Durham, W. C. Wilson, and their associates and successors shall be, and continue as they have been, a body politic and corporate under the name and style of DUKE UNIVERSITY, and under such name and style shall have perpetual existence and are hereby invested with all the property and rights of property which now belong to the said corporation, and said corporation shall henceforth and perpetually, by the name and style of DUKE UNIVERSITY, hold and use all the authority, privileges, and possessions it had or exercised under any former title and name, and be subject to all recognized legal liabilities and obligations now outstanding against such corporations.

Section 2. That such corporation is authorized to receive and hold by gift, devise, purchase or otherwise, property, real and personal, to be held for the use of said University and its dependent schools or for the use of either or both (as may be designated in the conveyance or will).

Section 3. That the Trustees shall be thirty-six in number of whom twelve shall be elected by the North Carolina Conference of the M. E. Church, South; twelve by the W. N. C. Conference of the said church; and twelve by the graduates of said University; *Provided*, however, That no person shall be elected a Trustee till he has first been recommended by a majority of the Trustees present at a regular meeting, and the Trustees shall have power to remove any member of their body who may remove beyond the boundary of the State or who may refuse or ne-

glect to discharge the duties of a Trustee. The term of office of Trustees shall be six years, and they shall be so arranged that four Trustees shall be elected by each Conference and four by the graduates every two years. The Trustees shall regulate by bylaws the manner of election of Trustees to be chosen by the graduates. Should there exist a vacancy by death, resignation, or otherwise of any Trustee, the same shall be filled for the unexpired term by the Board of Trustees. That the present Trustees shall continue and remain in office during the term for which they have been heretofore respectively elected.

Section 4. That the said corporation shall be under the supervision, management and government of a president and such other persons as said Trustees may appoint; the said president, with the advice of other persons so appointed, shall from time to time make all needful rules and regulations for the internal government of said University and prescribe the preliminary examinations and terms and conditions on which pupils shall be received and instructed.

Section 5. That said Trustees shall have power to make such rules, regulations, bylaws not inconsistent with the Constitution of the United States and of this State, as may be necessary for the good government of said University and management of the property and funds of the same.

Section 6. That the Trustees shall have power to fix the time of holding their annual and other meetings, to elect a president and professors for said University, to appoint an executive committee to consist of not less than seven members, which committee shall control the internal regulations of said University and fix all salaries and emoluments, and to do all other things necessary for an institution of learning not inconsistent with the laws of this State and of the United States.

Section 7. That the Faculty and Trustees shall have the power of conferring such degrees and marks of honor as are conferred by colleges and universities generally; and that five Trustees shall be a quorum to transact business.

Section 8. That all laws and parts of laws or of the charter heretofore granted which are in conflict with this act are hereby repealed.

Section 9. That this act shall be in force from and after its ratification and acceptance by the Board of Trustees.

3. THE BYLAWS OF THE UNIVERSITY

Article I. Aims

1. The aims of Duke University are to assert a faith in the eternal union of knowledge and religion set forth in the teachings and character of Jesus Christ, the Son of God; to advance learning in all lines of truth; to defend scholarship against all false notions and ideals; to develop a Christian love of freedom and truth; to promote a sincere spirit of tolerance; to discourage all partisan and sectarian strife; and to render the largest permanent service to the individual, the state, the nation, and the church. Unto these ends shall the affairs of this University always be administered.

Article II. Board of Trustees

1. Powers. All powers of the University shall be vested in a Board of Trustees consisting of thirty-six elected members.

2. Nomination and elections. The Trustees shall be elected as follows: twelve by the North Carolina Conference of the Methodist Church; twelve by the Western North Carolina Conference of the Methodist Church; and twelve by the graduates of Duke University. Each year a roster of nominees shall be referred to the Board by a committee of two faculty members elected by the principal faculty council, two students elected by the principal student council, the president of the Alumni Association and the President of the University as Chairman. The President shall add to the roster nominees proposed by individual students, faculty members and Trustees. For positions to be filled by the graduates of Duke University, the President shall place on the roster nominees proposed by the officers of the National Council and of the General Alumni Association. The Board, after hearing the recommendations of the Executive Committee, and by a majority of the Trustees present at any regular meeting, shall recommend the persons to be elected Trustees and submit its recommendations to the appropriate conference of the Methodist Church and the graduates.

No person who shall have attained the age of seventy years shall be elected a Trustee.

3. Term. The term of office of a Trustee shall be six years, beginning on the first day of January following election. Terms shall be so arranged that four Trustees shall be elected by each Conference and four by the graduates every two years. No person shall serve more than two consecutive six-year terms, with renewed eligibility for election to the Board following not less than two years absence of membership; provided that Trustees presently (September, 1970) serving a second full term are eligible for re-election for one additional term without an absence of two years.

4. Vacancies. Any vacancy in the membership of the Board shall be filled for the unexpired term by a majority vote of the Trustees present at a regular meeting of the Board from the roster of nominees.

5. Retirement. A Trustee shall retire on the first day of January after he attains the age of seventy, provided however, that Trustees serving on the Board as of September 1970 may complete their current terms. A Trustee who would attain the age of seventy years during a two-year period of ineligibility shall retire at the end of the term for which he was elected.

6. Emeritus. The Board may elect a retiring Trustee a Trustee Emeritus. Trustees Emeriti shall be entitled to receive notice of all meetings of the Board and attend and participate in such meetings, but shall not have the right to vote. Trustees Emeriti shall be eligible for membership on any standing committee other than the Executive Committee.

7. Removal. Any Trustee who may refuse or neglect to discharge the duties of a Trustee may be removed by the affirmative vote of three-fourths of the members of the entire Board of Trustees.

Article III. Meetings of the Board

1. Annual Meeting. Annual meetings of the Board of Trustees shall be held on the day next preceding the day on which the graduation exercises take place.

2. Regular Meetings. Regular meetings of the Board shall be held on the

Saturday preceding the day on which Founders' Day is celebrated, and on the first Friday in March.

3. Special Meetings. Special meetings shall be held upon the call of the Chairman, or upon written request of twelve or more Trustees addressed to the Secretary, with a copy to the Chairman specifying the business to be transacted at the meeting.

4. Notice. The Secretary shall give at least five days' notice to each member of the Board stating the time and place of all meetings, and the purpose of any special meeting.

5. Place. All meetings of the Board of Trustees shall be held at Duke University in the City of Durham, North Carolina, except that the Trustees by vote, or written assent, of a majority of the then members of the Board may designate another place for any meeting.

6. Quorum. A majority of the then members of the Board of Trustees shall be a quorum for the transaction of business.

Article IV. Officers of the Board

1. Officers of the Board. The officers of the Board shall be a Chairman, a Vice Chairman and a Secretary.

2. Election. The officers of the Board of Trustees shall be elected at its annual meeting for a term of one year or until their successors are elected and qualified.

3. Duties.

a. The Chairman shall preside at all meetings of the Board, shall represent the Trustees at public meetings of the University, and shall be a member of and Chairman of the Executive Committee.

b. The Vice Chairman shall perform the duties of the Chairman in the absence or disability of the Chairman, or in the event of a vacancy in that office.

c. The Secretary of the University shall also be the Secretary of the Board of Trustees. He shall record the minutes of all meetings of the Board and its Executive Committee, and shall have custody of the Charter, Bylaws, minutes, records and other documents of the Board and its Committees. The Secretary shall send a copy of the minutes to each member of the Board promptly after each meeting of the Board and of the Executive Committee.

4. Vacancies. A vacancy in any office of the Board of Trustees may be filled for the unexpired term by the Board of Trustees.

Article V. Committees of the Board

1. Committees. The standing committees of the Board shall be:

- a. The Executive Committee
- b. The Business and Finance Committee
- c. The Building and Grounds Committee
- d. The Institutional Advancement Committee
- e. The Academic Affairs Committee

The Board may authorize other committees from time to time.

2. Membership. At each annual meeting, the Board of Trustees shall elect the Chairmen (who shall be Trustees) and other members of the standing committees to serve for the ensuing year. The Chairman of the Board, the Vice Chairman of the Board and the President of the University shall be members of the Executive Committee. The President of the University shall be a member of all other standing committees of the Board.

Nominations of faculty and student members shall be from lists of prospects developed by the President in consultation with representative student and faculty groups.

The number of Trustee members and non-Trustee members of any standing committee shall be determined by the Board of Trustees after receiving the recommendation of the committee chairman, and the Trustees may authorize and elect such committee members at any meeting in addition to the annual meeting.

Insofar as practical, membership on the standing committees should be rotated.

The Committees of the Board shall have the powers and duties set forth in these Bylaws and such other powers and duties as the Board may delegate to them. They shall exercise their powers and perform their duties subject to the direction and approval of the Board. They may from time to time make recommendations to the Board for the establishment of new policies or any changes in existing policies, but without decision-making authority except pursuant to specific delegation by the Board or the Executive Committee.

3. Vacancies. Any vacancy in the membership of a standing committee shall be filled by the Chairman of the Board of Trustees after consultation with the President of the University.

4. Meetings. Each standing committee shall meet at such times and places and upon such notice as it may determine, and shall file a copy of the minutes of each meeting with the Secretary of the University.

5. Quorum. A majority of the then members of a standing committee shall be a quorum for the transaction of business.

Article VI. Executive Committee

1. Membership. The Chairman of the Board (to serve as Chairman), the Vice Chairman of the Board (to serve as Vice Chairman), the President of the University, the Chairman of each standing committee, and not more than three Trustee members at large shall constitute the Executive Committee of the Board.

2. Powers and Duties. The Executive Committee shall:

- a. Subject to the provisions of the Charter and these Bylaws exercise all powers of the Board of Trustees in the interim between meetings of the Board.
- b. Appoint an Investment Committee of not less than five members, at least two of whom shall be Trustees, with the other members being selected from Trustees and officers of Duke University, and Trustees and officers of The Duke Endowment, with such powers and duties as may be assigned to it by the Executive Committee.
- c. Coordinate the activities of the other standing committees.

- d. Exercise other duties as prescribed in the Charter or as may be delegated by the Board of Trustees.
- e. Report its actions to the Board of Trustees.

Article VII. Business and Finance Committee

1. Membership. The Business and Finance Committee shall be composed of not less than four Trustees, at least one faculty member, at least one student and the Vice President for Business and Finance, ex officio.

2. Powers and Duties. The Business and Finance Committee shall:

- a. Keep informed on, consider proposals for, and make recommendations with respect to, the general business affairs and financial organization of the University.
- b. Receive and review the annual budgets and recommend their approval or modification.
- c. Maintain an ongoing analysis and review of monthly operating statements, periodic construction summary, and internal audit reports.
- d. Recommend the annual appointment of independent auditors. Receive the annual report of the auditors and submit it with recommendations for action.

The Committee shall report its findings and recommendations to the Board of Trustees or the Executive Committee.

Article VIII. Building and Grounds Committee

1. Membership. The Building and Grounds Committee shall be composed of not less than five Trustees, at least one faculty member, at least one student, and the Vice President for Business and Finance, ex officio.

2. Powers and Duties. The Building and Grounds Committee shall consider proposals for, and make recommendations with respect to:

- a. Siting of all buildings and related appurtenances such as utilities, roads, and parking areas.
- b. Commissioning of Project Architects and Engineers, and approval of proposed Contractors for construction projects.
- c. Evaluation and promulgation of continuing Master Plan for long-range development of the total physical environment of the University, including inherent standards of aesthetics and quality.
- d. Evaluation of design characteristics of individual projects for adherence to established standards.
- e. Major renovation work.
- f. Naming of facilities and parts of facilities.

The Committee shall review priorities for construction and shall have authority to accept all new construction on behalf of the University, but shall not incur any expenses not previously authorized by the Board of Trustees or the Executive Committee.

The Committee shall report its findings and recommendations to the Board of Trustees or the Executive Committee.

Article IX. Institutional Advancement Committee

1. Membership. The Institutional Advancement Committee shall be composed of not less than five Trustees, at least one faculty member, at least one student, and the Vice President for Institutional Advancement, ex officio. Not less than three of the Trustee members shall be alumni of the University.

2. Powers and Duties. The Institutional Advancement Committee shall consider proposals for, make recommendations with respect to, and assist the President in, the financial development, fund raising, public relations, and alumni affairs of the University, and carry out other projects and assignments as directed by the Board.

The Committee shall report its findings, recommendations and results to the Board of Trustees or the Executive Committee.

Article X. Academic Affairs Committee

1. Membership. The Academic Affairs Committee shall be composed of not less than six Trustees, not less than two faculty members, not less than two students, and the Provost, ex officio.

2. Powers and Duties. The Academic Affairs Committee shall:

- a. Consider proposals for, and make recommendations with respect to, the the educational role of each school, college, and unit of the University and for the University as a whole; provisions for the admission of students at all levels, student life and activities; educational, research, and library programs; and the coordination of all educational activities.
- b. Promote and coordinate activities of the Boards of Visitors, review their findings, and transmit their reports to the President, and to the Board of Trustees. The President shall appoint the members of the Boards of Visitors.
- c. Designate five Trustees from this Committee who, along with an equal number of faculty members designated by the President, and the President, ex officio, shall serve as a Committee on Honorary Degrees to make recommendations to the University faculty and the Board of Trustees.
- d. Serve as a Committee on Earned Degrees.
- e. Serve as liaison with the University faculty with respect to academic affairs.

The Committee shall report its findings and recommendations to the Board of Trustees or the Executive Committee.

Article XI. Officers of the University

1. The Officers of the University shall be a President, a Chancellor, a Provost, a Vice President for Business and Finance, a Vice President for Institutional Advancement, one or more other Vice Presidents, a Treasurer, a Secretary, a University Counsel, and such other officers as the Board of Trustees may elect. One person may hold more than one office, except that the offices of President and Secretary may not be held by the same person.

2. These officers shall be elected by the Board of Trustees at its annual meeting for a term of one year and shall serve until their successors are elected and have taken office.

3. A vacancy in any office of the University may be filled, for the un-expired term, by the Board of Trustees or by the Executive Committee.

Article XII. President

1. The President shall be the chief educational and administrative officer of the University. He shall be responsible to the Board of Trustees for the supervision, management, and government of the University, and for interpreting, and carrying out the policies of the Board of Trustees. He shall have the powers and duties set forth in the Charter and in these Bylaws, and such other powers and duties as the Board of Trustees shall delegate to him.

2. He, or someone designated by him, shall preside at all academic functions and represent the University before the public.

3. He shall preside at all meetings of the University Faculty. He may veto any action taken by the University Faculty or any action taken by the faculty of any college or school in the University and state his reasons for such action.

4. He shall submit a proposed annual budget for the University to the Executive Committee prior to the beginning of the fiscal year covered by the budget.

5. He shall submit to the Board of Trustees an annual report on the condition, operations and needs of the University.

6. He shall recommend to the Board of Trustees persons to be officers of the University other than the President.

Article XIII. Chancellor

1. The Chancellor, under the President, shall exercise the powers and duties of the President as delegated by the President from time to time.

2. He shall assume the powers and duties of the President during the incapacity or absence of the President when specifically authorized by the President or the Board of Trustees, or in case of a vacancy in the Office of President.

Article XIV. Provost

1. The Provost shall be an executive officer of the University, under the President, responsible for all educational affairs and activities, including research, and for all aspects of student activity and welfare. He shall have the powers and duties assigned to him by the President and shall report to the President.

2. He shall be a member of the faculty of each college and school, and ex officio a member of each committee (other than Committees of the Board of Trustees) or other body concerned with matters for which he is responsible.

3. He shall receive recommendations developed by the faculty and educational officers for consideration and recommendation to the President.

Article XV. Vice President for Business and Finance

1. The Vice President for Business and Finance shall be an executive officer, under the President, responsible for all business and finance, including accounting

and auditing, preparation of budgets, fiscal planning, and operating of services of the University. He shall have the power and duties assigned to him by the President and shall report to the President.

2. He shall have custody of all records, contracts, agreements, deeds, and other documents of the University or relating to its operations or properties, except minutes of meetings.

3. He shall submit to each regular meeting of the Executive Committee a report on those aspects of the finances of the University that the Executive Committee may require, and shall submit to the Board of Trustees at the end of each fiscal year an account of all receipts and disbursements for the preceding year and a statement in such detail as the Board of Trustees may require of the financial condition of the University at the end of such year.

4. He and the personnel under him shall be bonded to the extent determined by the Executive Committee.

Article XVI. Vice President for Institutional Advancement

The Vice President for Institutional Advancement shall be an executive officer, under the President, responsible for all public and alumni relations, fund raising, and long range planning and development. He shall have the powers and duties assigned to him by the President and shall report to the President.

Article XVII. Treasurer

1. The Treasurer shall report to the President or such officer of the University as the President may direct and shall have the powers and duties assigned to him by the President or such other officer.

2. He may receive and disburse investment funds and purchase, sell, or otherwise dispose of investment securities pursuant to the directions of the Executive Committee or Investment Committee, as the case may be.

3. He and the personnel under him shall be bonded to the extent determined by the Executive Committee.

Article XVIII. Secretary

1. The Secretary, under the President, shall have all of the powers and duties set forth in these Bylaws and the powers and duties commonly incident to his office. He also shall have the powers and duties assigned to him by the President and shall report to the President.

2. He shall be the custodian of the seal of the corporation and shall affix and attest to same on all duly authorized contracts, deeds, and other documents.

3. He shall maintain an official roster setting forth the status of all persons employed by the University.

Article XIX. University Counsel

The University Counsel shall be the legal advisor to the University and shall be responsible for all matters of a legal nature concerning the University, including litigation, preparation or approval of all contracts, deeds, conveyances, or other documents.

Article XX. Faculty

1. The University Faculty shall be composed of the President, the Chancellor, the Provost, the Vice Presidents, the Secretary (who shall also be the Secretary of the Faculty), all deans, professors, associate professors, and assistant professors, and all other full-time members of the instructional staff who are not candidates for degrees at Duke University, Registrar, and the University Librarian, and such other persons as may be designated by the President and approved by the Executive Committee or the Board of Trustees.

2. The University Faculty shall be responsible for the conduct of instruction and research in the various colleges and schools in the University. It may also consider and make recommendations to the President regarding any and all phases of education at the University.

3. The University Faculty shall approve and recommend to the Board of Trustees the persons it deems fit to receive degrees or other marks of distinction, and the establishment of any new degree or diploma.

4. The University Faculty may organize and exercise its functions through appropriate councils, committees, or other bodies.

5. Each college and school in the University may have a faculty of its own, which shall be composed of the President, the Chancellor, the Provost, the Secretary, and all members of the University Faculty in the particular college or school. Each such faculty shall function under the President and other officers of educational administration and subject to the regulations of the University Faculty.

Article XXI. Appointments, Promotions and Tenure

1. Members of the University Faculty shall be elected, appointed, or promoted by the Board of Trustees or the Executive Committee upon the recommendation of the Provost, with the approval of the President.

2. Members of the University Faculty, above the rank of instructors, shall have tenure after seven years of continuous service at the University, or such shorter period as may be determined for individual cases by the Board of Trustees or the Executive Committee; provided that any such person shall be subject to dismissal by the Board of Trustees or the Executive Committee for misconduct or neglect of duty.

Article XXII. Sabbatical Leaves

1. Each member of the University Faculty of the rank of professor, associate professor, or assistant professor shall be eligible for sabbatical leave after each six years of service to the University. Such leave may be taken for a full year at half salary or a half year at full salary.

2. Sabbatical leave may be granted by the Executive Committee upon the written recommendation of the dean of the appropriate college or school, approved by the Provost and the President.

Article XXIII. Retirement

1. All members of the faculty of the University who are eligible for or participate in the TIAA Plan and who would attain the age of seventy years prior to

March 1 of a given academic year shall retire at the end of the preceding academic year and all such members of the faculty who attain the age of seventy years on or after March 1 in a given academic year shall retire at the end of such academic year.

2. The retirement and annuity plan adopted by the University on October 1, 1925, is hereby amended in those respects required to conform with the provisions of the Bylaws.

Article XXIV. Fiscal Year, Academic Year and Academic Calendar

1. The fiscal year of the University shall commence on July 1 and end on the following June 30.

2. The academic year of the University shall commence on September 1 and end on the following August 31.

3. The President shall establish the academic calendar for each academic year, and designate the day on which the graduation exercises shall take place.

Article XXV. Amendment of Bylaws

These Bylaws may be amended at any regular meeting of the Board of Trustees by the affirmative vote of two-thirds of the then membership of the Board, provided that the proposed amendment is mailed by the secretary of the Board to each member at least twenty days before the meeting.

Alumni Organizations

All qualified former students of Duke University are enrolled as members of the General Alumni Association, which meets on the campus each June. The Association elects its officers and alumni representatives to the Athletic Council each spring by mail ballot. Graduate alumni also elect four representatives to the University Board of Trustees in alternate years by mail ballot.

In addition to the General Alumni Association, there are individual sub-associations for seven of the University's ten schools and colleges. These include, at the undergraduate level, The Woman's College, the School of Nursing, and the School of Engineering, and at the graduate and professional level, the Schools of Medicine, Forestry, Law, and Divinity.

Each class that has been graduated from the University also exists as a permanent organization, and its members reunite at intervals of approximately five years. In some 100 locations, where Duke alumni live in concentrated numbers, there are local alumni associations with purposes compatible to those of the General Alumni Association.

The executive body of the organized alumni is the Duke University National Council. Its membership includes representatives from each alumni organization as well as from each University faculty and from the various student bodies. The National Council meets twice each year, at Founders' Day in December and during Alumni Week End in June.

The Department of Alumni Affairs exists as the University's administrative

and coordinating agency for the broad spectrum of alumni programs. The Loyalty Fund program of annual giving is also administered by the Department of Alumni Affairs.

The broad purpose of the Duke University alumni organization can best be indicated by quoting Article II of the constitution of the General Alumni Association: "The objects of this Association shall be to unite its members in good fellowship and in cooperative enterprise with the faculties, students, officers, and trustees of Duke University, toward the fulfillment of the University's educational and humanitarian purposes; to aid in providing for the University an atmosphere in which scholarship and learning might flourish and in which the continuing search for truth and enlightenment might proceed unhindered; and in all appropriate ways to assist and stimulate Duke University toward significant achievement and influence."

Gifts and Bequests

Duke University is a privately established institution which derives its principal support from endowment funds and from gifts and grants, thus enabling it to offer both academic and professional training to its students at a fraction of the actual cost. Gifts and grants for both operational and capital development purposes presently account for approximately one-half of the University's annual income. They are essential to the quality of its educational services and to its progress as a center of learning and research.

Gifts to Duke University, of course, fully qualify as tax deductible contributions.

The University welcomes gifts, immediate or deferred, when made without restriction as to use or when designated for any of a broad variety of purposes. Gifts may be of cash, securities, or any kind of real or personal property, depending upon the wishes and the conveniences of the donor, and University officers are prepared to confer at any time to make sure that both the donor's wishes and possible tax advantages are fully realized.

A number of publications, designed to assist the donor in making a gift, are available, and requests for these or other information will be promptly acknowledged. Such requests should be addressed to the Office of the Vice President and Treasurer, 211 Allen Building, Duke University, Duke Station, Durham, N.C.

Deferred gifts may be made through bequests or through insurance, as well as through a variety of trust arrangements. Such gifts may become significant factors in estate planning, and while qualified counseling is essential in most instances, some sample bequest forms may be noted.

GENERAL

I give (devise; if real property) and bequeath to Duke University, a corporation existing under the laws of the State of North Carolina and located in the City and County of Durham, State of North Carolina, and its successors forever, the sum of dollars (or otherwise describe the gift) for the general purposes and uses of the University at the discretion of the Board of Trustees.

SPECIFIC

I give (devise; if real property) and bequeath to Duke University, a corporation existing under the laws of the State of North Carolina and located in the City and County of Durham, State of North Carolina, or its successors forever, the sum of dollars (or otherwise describe the gift) and direct that the income therefrom shall be used for the following purposes, viz. (here describe the use desired).

CODICIL

Having hereinbefore made my last Will and Testament dated, and being of sound mind, I hereby make, publish, and declare the following codicil thereto; (here insert clause in same form as if it had been included in body of Will). Except as hereinbefore changed, I hereby ratify, confirm, and republish my said last Will and Testament.

Office of Information Services

The Office of Information Services is the official news agency of the University, and all University news, except sports, emanates from this office. The Office maintains the University's relationship with the press, radio and television, and other communications media, and interprets the University—its faculty, its research, and its academic achievements—to the public via these media.

The Office also maintains individual biographical files on all faculty members, students, and staff, as well as files on all University departments and activities. Its files of clippings form a rich source of historical information of the Institution's life. In addition, the Office is a source of information for the many inquiries about Duke University which are received daily from all sections of the nation and from abroad.

BULLETIN OF DUKE UNIVERSITY
Directory of Officers, Faculty, and Staff

Vol. 44, No. 9A April 1972



Bulletin of Duke University 1972-1973

Medical Center



Bulletin of Duke University

Medical Center

1972-1973

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School of Medicine Calendar 1972-73

First Year (Freshmen) Students

1972

August

31 Thursday, 8:30 a.m.—Orientation

September

1 Friday, 8:30 a.m.—Examination day

1 Friday—Fees and tuition payable

4 Monday—Labor Day holiday

5 Tuesday, 8:00 a.m.—First day of academic year, 1972-73, begin Term I

November

3 Friday—Fees and tuition payable

22 Wednesday, 6:00 p.m.—Begin Thanksgiving holiday

27 Monday, 8:00 a.m.—Classes resume

December

22 Friday, 6:00 p.m.—Begin Christmas holiday

1973

January

2 Tuesday, 8:00 a.m.—Classes resume

12 Friday—Fees and tuition payable

13 Saturday, 12:30 p.m.—End Term I

15 Monday, 8:00 a.m.—Begin Term II

March

16 Friday, 6:00 p.m.—Begin spring vacation

17 Saturday—Fees and tuition payable

26 Monday, 8:00 a.m.—Classes resume

May

2 Wednesday, 8:00 a.m.—Examination day

12 Saturday, 12:30 p.m.—End Term II

A REQUIRED INTERIM TERM FOR ALL FRESHMEN MEDICAL STUDENTS WILL BEGIN ON MONDAY, MAY 15, 1973. FINAL SCHEDULE TO BE ANNOUNCED.

Second Year (Sophomore) Students

1972

May

26 Friday—Fees and tuition payable for optional summer term

June

- 13 Tuesday, 8:30 a.m.—National Boards Part I
- 14 Wednesday, 8:30 a.m.—National Boards Part I
- 19 Monday, 8:00 a.m.—Begin optional summer term, 1972 (Clinical Core Rotation)

July

- 4 Tuesday—Independence Day holiday

August

- 5 Saturday, 12:00 Noon—End optional summer term
- 21 Monday, 8:00 a.m.—First day of academic year, 1972-73, begin Term 1 (Clinical Core Rotations)

September

- 1 Friday—Fees and tuition payable
- 4 Monday—Labor Day holiday

October

- 7 Saturday, 12:00 Noon—End Term 1
- 9 Monday, 8:00 a.m.—Begin Term 2

November

- 3 Friday—Fees and tuition payable
- 22 Wednesday, 6:00 p.m.—End Term 2
- 22 Wednesday, 6:00 p.m.—Begin Thanksgiving holiday
- 27 Monday, 8:00 a.m.—Classes resume, begin Term 3

December

- 21 Thursday, 8:00 a.m.—Begin Christmas holiday

1973**January**

- 3 Wednesday, 8:00 a.m.—Classes resume
- 12 Friday—Fees and tuition payable
- 27 Saturday, 12:00 Noon—End Term 3
- 29 Monday, 8:00 a.m.—Begin Term 4

March

- 7 Wednesday—Registration for summer term, 1973, and Terms 1, 2, 3, 4, 1973-74 (Third Year Elective Program)
- 17 Saturday, 12:00 Noon—End Term 4, begin spring vacation
- 17 Saturday—Fees and tuition payable
- 26 Monday, 8:00 a.m.—Classes resume, begin Term 5

April

- 2-5 Monday-Thursday—Preregistration for Graduate School fall and summer semester, 1973

May

- 2 Wednesday, 8:30 a.m.—Examination day (all students)
- 12 Saturday, 12:00 Noon—End Term 5

Third Year (Junior) and Fourth Year (Senior) Students**1972****May**

- 15 Monday, 8:00 a.m.—Begin optional Summer Term I, 1972
- 26 Friday—Fees and tuition payable for optional Summer Term I

July

- 4 Tuesday—Independence Day holiday
- 7 Friday—Fees and tuition payable for optional Summer Term II
- 8 Saturday, 12:00 Noon—End optional Summer Term I
- 10 Monday, 8:00 a.m.—Begin optional Summer Term II

September

- 1 Friday—Fees and tuition payable
- 2 Saturday, 12:00 Noon—End optional Summer Term II
- 5 Tuesday, 8:00 a.m.—First day of academic year 1972-73, begin Term 1

October

- 28 Saturday, 12:00 Noon—End Term 1
- 30 Monday, 8:00 a.m.—Begin Term 2

November

- 3 Friday—Fees and tuition payable
- 22 Wednesday, 6:00 p.m.—Begin Thanksgiving holiday
- 27 Monday, 8:00 a.m.—Classes resume

December

- 23 Saturday, 12:00 Noon—End Term 2, begin Christmas holiday

1973**January**

- 12 Friday—Fees and tuition payable
- 15 Monday, 8:00 a.m.—Begin Term 3

March

- 7 Wednesday—Registration for summer term, 1973, and Terms 1, 2, 3, 4, 1973-74 (Fourth Year Elective Program)
- 10 Saturday, 12:00 Noon—End Term 3
- 16 Friday—Fees and tuition payable
- 19 Monday, 8:00 a.m.—Begin Term 4

May

- 2 Wednesday, 8:30 a.m.—Examination day (all students)
- 12 Saturday, 12:00 Noon—End Term 4

University Administration

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*On leave through August 31, 1972.

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Trent Prize

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School of Medicine



1

General Information

History

In 1924, James Buchanan Duke established The Duke Endowment, and thus made possible the creation of Duke University.

I have selected Duke University as one of the principal objects of this trust because I recognize that education, when conducted along sane and practical, as opposed to dogmatic and theoretical, lines is, next to religion, the greatest civilizing influence.

I have selected hospitals as another of the principal objects of this trust because I recognize that they have become indispensable institutions, not only by way of ministering to the comfort of the sick, but in increasing the efficiency of mankind and prolonging human life. . . . I very much hope that the people will see to it that adequate and convenient hospitals are assured in their respective communities. . . . It is to these rural districts that we are to look in large measure for the bone and sinew of our country.

In Item VIII of his will, Mr. Duke bequeathed to The Duke Endowment ten million dollars for Duke University, of which four million dollars was to be expended for a medical school, hospital, and nurses' home at Duke University.

Wards and clinics in the hospital were named for eminent physicians and surgeons in order to remind the staff and students of what has been accomplished in medicine, as well as to follow Mr. Duke's Indenture: "I advise courses in history, especially the lives of the great of the earth."

The School of Medicine and Duke Hospital (consisting of 400 beds) were opened in 1930 under the leadership of the first dean, Dr. Wilburt C. Davison who had recruited an outstanding faculty on a geographic full-time basis. During that same year, the first class of medical students, hospital administration students, and dietetic students were admitted. The Private Diagnostic Clinic was organized in 1932 to provide coordinated medical and surgical care for private patients of moderate incomes.

Over the years the Medical Center has been enlarged and its programs expanded by new construction, and by the acquisition of, and affiliation with, established hospitals.

Currently, the Medical Center at Duke University consists of the following buildings on the campus where the offices and departments listed are located: *Davison Building*—Departments of Anatomy, Ophthalmology, and Pathology, and Central Teaching Facility, Division of Audiovisual Education, Library, Medical Center Administration, Student Lounge, Office of Admissions; *Duke Hospital*—Department of Anesthesiology, Medicine, Pediatrics, and Surgery, and Amphitheater, Chapel, Private Diagnostic Clinics, Outpatient Clinics, Pharmacy, Physical Therapy; *Nanaline B. Duke Medical Science Building*—Departments of Biochemistry and Physiology-Pharmacology; *Gerontology Building*—Center on Aging, Department of Psychiatry, offices and laboratories of Medicine, Pediatrics, and Surgery; *Diagnostic and Treatment Building*—offices and clinics of Medicine, Surgery, Pediatrics, and Psychiatry; *Clinical Research I*—offices and laboratories of Medicine and Surgery and Research Wards; *Clinical Research II*—Hyperbaric Unit, offices and laboratories of Medicine, Surgery, Pediatrics, and Psychiatry, and the Clinical Cancer Research Unit; *Medical Research Laboratories*—offices and laboratories of Physical Anthropology, Microbiology, and Radiology; *Research Park*—Department of Microbiology and Immunology, offices and laboratories of Medicine, Surgery, Pediatrics, and Radiology; *Main Entrance Building*—Hospital Administration, offices and laboratories of Obstetrics-Gynecology and Pediatrics, delivery rooms, and the Emergency Service; *Baker House*—offices of Nursing, Medicine, Surgery, Obstetrics-Gynecology, Hospital Administration, and Pastoral Care and Counseling; *Bell Building*—offices and laboratories of Medicine, Surgery, Pediatrics, Radiology, Anatomy, and Ophthalmology, and Information Services, Gross Anatomy Laboratories, and the Research Training Program; *Pickens Rehabilitation Center*—General and Rehabilitation Outpatient Clinics, Student Health Service, Employee Health Service, and Faculty Family Health Service; *Civitan Mental Retardation and Child Development Center*—offices, clinics, and laboratories of Psychiatry and Pediatrics; *Graduate Center*—Department of Community Health Sciences.

Under construction is the Alex Sands Medical Science Building which will house the Department of Anatomy and clinical science research programs of the Departments of Medicine, Surgery, Psychiatry, and Anesthesiology (scheduled



completion date, December, 1972), and an Eye Center which will house all patient care activities of the Department of Ophthalmology as well as their offices and laboratories (scheduled completion date, March, 1973).

Duke University Medical Center continues to strive to be a leader in contemporary medicine. This involves maintaining superiority in its four primary functions: unexcelled patient care, dedication to educational programs, national and international distinction in the quality of research, and service to the region.

Growth is identified with a deeper involvement in the social aspects of health, the establishment of many advanced therapeutic and research facilities, a building program that will require one or more decades for its completion, and a new and imaginative revision of the medical teaching program that has attracted the attention of educators across the globe.

Resources for Study

Library. Located in the Davison Building, the Medical Center Library serves the faculty, staff, and students with recorded holdings of 115,000 volumes and 1,700 periodicals. A professional reference service is available daily to assist readers in the use of the collections, catalogs, indexes, and other resources. Audio-visual aids are maintained for the use of individual students.

The Library includes the Trent Collection which is considered unsurpassed in the Southeast as a resource for the study of the history of medicine. Much of the material is of interest to literary and classical scholars as well as to those concerned with the history of medicine.

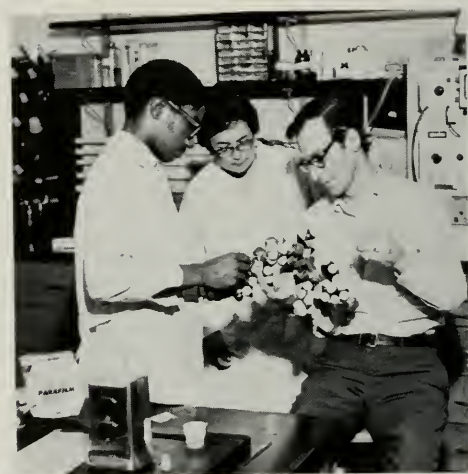
Branch collections of books and journals are maintained in the Nanaline B. Duke Medical Science Building and the School of Nursing.

The Medical Center Library is open: 8:30 a.m.-midnight-weekdays; 8:30 a.m.-11:00 p.m.-Saturdays; 10:00 a.m.-11:00 p.m.-Sundays. Summer and holiday hours are as announced.

Director and Curator: G. T. S. Cavanaugh, B.A., B.L.S., *Professor of Medical Literature*;
Associate Director: Warren P. Bird, B.S., M.S., *Assistant Professor of Medical Literature*.

The Central Teaching Facility. The Central Teaching Facility, located on the fourth floor of Davison Building, provides laboratory, demonstration, and conference space for all courses taught in the basic sciences with the exception of gross anatomy. A full-time staff maintains a wide range of equipment and provides supplies and services necessary for the teaching programs conducted in the facility, thus enabling the teaching staff of each department to devote its efforts entirely toward the students.

The teaching space in the Central Teaching Facility consists of five-unit laboratories each accommodating twenty students and one M.D.-Ph.D. candidate laboratory accommodating twelve students. These rooms are equipped with low benches and storage spaces assigned to each first-year student. Three small laboratories are interspersed between the six-unit laboratories and provide space for large pieces of equipment used in conjunction with exercises conducted in the unit laboratories. They also provide space for small laboratory projects. One large room capable of accommodating approximately sixty students is used interchangeably for sit-down or stand-up laboratory exercises. Three rooms which are designed to exhibit microscopic specimens and pictorial displays as well as to accommodate conference groups and limited laboratory exercises complete the areas constituting the Central Teaching Facility.



In addition to providing services to the School of Medicine, the Central Teaching Facility provides its resources for use throughout the year by various schools in the allied health sciences.

Manager: J. Edward King, M.A.; Assistant Manager: Helen Gillikin, Ph.D.

Division of Audiovisual Education. The Division of Audiovisual Education serves the Medical Center by providing all types of audiovisual materials to assist the faculty. There are three subdivisions: the Medical Art Facility, the Medical Photography Facility, and the Central Television Facility.

The Medical Art Facility provides illustrations produced by various art methods and techniques. Services rendered are medical illustrations, schematic and mechanical drawings, diagrams, charts, graphs, designs, lettering, signs, casts, models and exhibits, and other forms of illustrations. The production of facial prostheses and instruction in the use of opaque cosmetics are performed by the Facial Prosthesis Unit, a subsection of the Medical Art Facility.

The Medical Photography Facility is staffed and equipped to provide all photographs needed in the diagnosis and treatment of patients, for teaching, and in research. For example, the photographers take pictures of patients, including

such fine details as the patterns of vessels on the retinae or those of the skin as they are revealed by infrared light. Surgical and other procedures are recorded in motion pictures to be used for instruction and to enhance the patient record.

The Central Television Facility also provides services for teaching, research, and patient care programs. During the past several years, a collection of videotaped material has been produced for group teaching and individual student study. In addition, a two-channel television link (I.T.F.S.) has been established between the Central TV Facility and the Durham V. A. Hospital. This link makes possible two-way, two-channel transmissions for use in educational programs.

Although no formal study programs in medical art, medical photography, and medical television are scheduled, individual training is available for those who wish to pursue careers in the medical audiovisual field.

Director: Sam A. Agnello, A.B.

Duke Hospital. Duke Hospital, one of the largest private hospitals in the South, is an integral part of the Medical Center and currently has 800 beds. The hospital directs its efforts toward the three goals of expert patient care, professional education, and service to the community. It offers patients modern comprehensive diagnostic and treatment facilities and special acute care and intensive nursing units for seriously ill patients. Ambulatory patients who need little nursing attention may be admitted to a minimal care unit. Surgical facilities include eighteen operating rooms where hospital surgeons perform more than 13,000 operative procedures annually. Approximately 1,800 babies are born each year in the delivery suite. Other special facilities for patients include a heart catheterization laboratory, cancer research unit, pulmonary care unit, hyperbaric oxygenation chamber, and cardiac care unit.

Patients have their choice of private, semi-private, or ward accommodations; and more than 23,000 are admitted annually. Close working relationships with private and governmental health and welfare agencies provide opportunities for continued care of patients after they leave Duke Hospital.

Ambulatory services include the nonprivate outpatient clinics, private diagnostic clinics, the employee health office, and the emergency department, with





annual total patient visits of 300,000. The clinical faculty of Duke University School of Medicine participates in undergraduate and graduate medical education and practices medicine in the hospital and private diagnostic clinics.

Duke Hospital with a house staff of approximately 360 is approved for internship and residency training by the Council on Medical Education and Hospitals of the American Medical Association and is fully accredited by the Joint Commission on Accreditation of Hospitals.

Veterans Administration Hospital. The Durham Veterans Administration Hospital, with 489 beds, annually admits over 7,000 patients. Within walking distance from the School of Medicine, closely integrated teaching and training programs for medical students and house staff are provided by the full-time professional staff who are members of the faculty of Duke University School of Medicine.

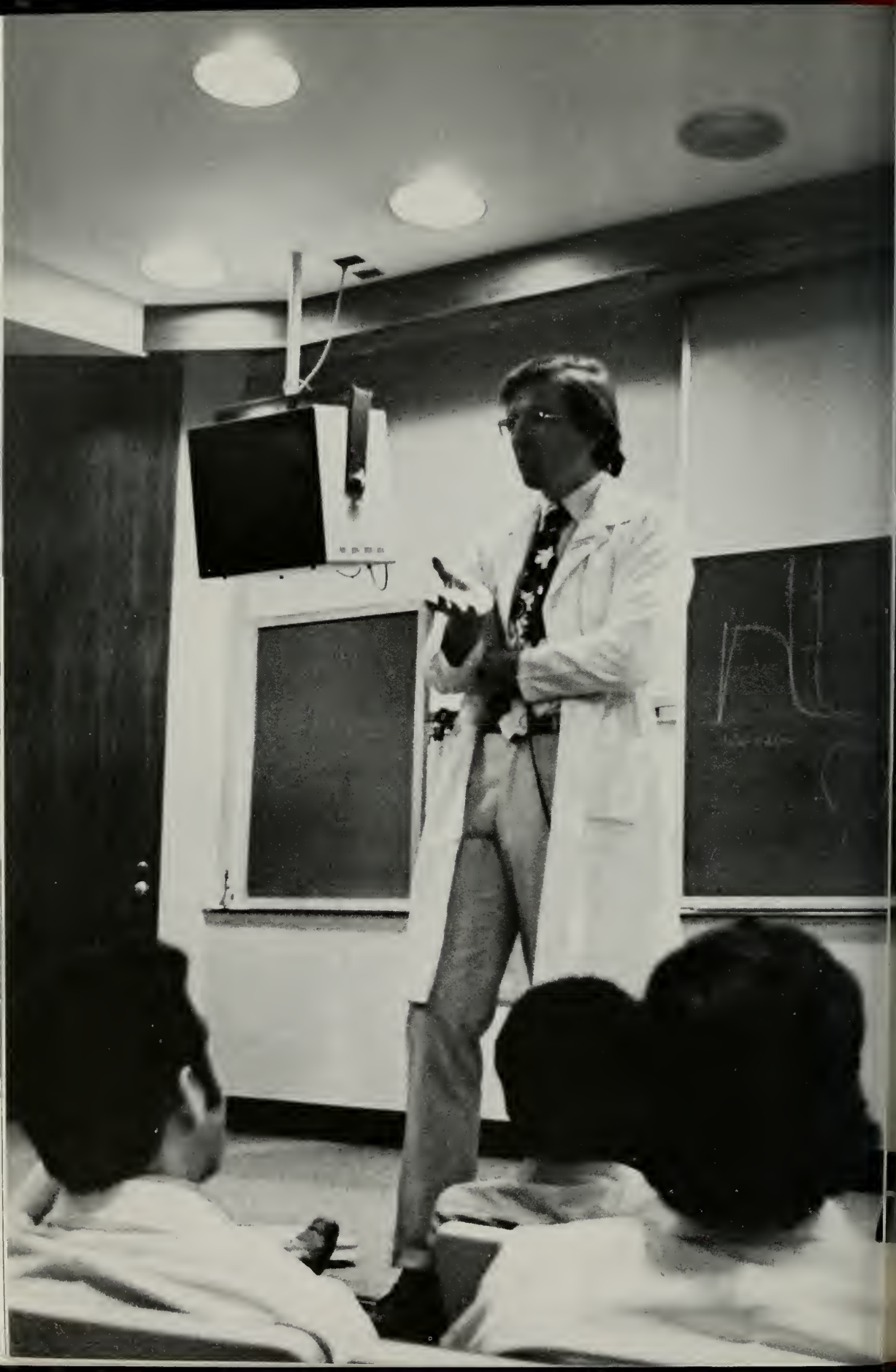
Highland Hospital. Highland Hospital, in Asheville, North Carolina, is a 131 bed, private, nonprofit, psychiatric hospital. It was founded in 1904 by Dr. Robert S. Carroll who donated the hospital in 1939 to the Duke University Medical Center. In July, 1967, Highland Hospital was fully integrated into the Duke University Medical Center as a division of the Department of Psychiatry.

All full-time psychiatrists, psychologists, and social workers at Highland Hospital hold academic appointments in the Department of Psychiatry of the Duke University Medical Center. The faculty at Highland is active in teaching psychiatry, psychology, and psychiatric social work to medical students, psychiatric residents, student psychologists, student social workers, and physician's associate students. Members of the faculty may also be involved in psychiatric and psychological research as well. These academic endeavors, and a striving for excellence that accompanies them, provide a stimulating atmosphere for the best possible patient care.

Sea Level Hospital. Sea Level Hospital in Carteret County, North Carolina, became part of Duke University Medical Center in 1969 as a result of a gift by D. E. Taylor and family of West Palm Beach, Florida. The 90-bed community hospital retains its professional and administrative staff, with representatives of the Medical Center serving in an advisory capacity. It provides an opportunity for medical students to obtain experience in the practice of medicine in a small community.

North Carolina Cerebral Palsy Hospital. The North Carolina Cerebral Palsy Hospital, with 40 beds, is a residential rehabilitation center for children with neuromuscular and skeletal diseases, primarily cerebral palsy. Although it is a state institution, physicians on the faculty of Duke University Medical Center conduct interdepartmental teaching and training programs for house staff, medical students, and the Cerebral Palsy Hospital staff.

Other Hospitals. Various cooperative teaching and training programs are available for medical and allied health professional students and house staff at other hospitals including Watts Hospital, Lincoln Hospital, and McPherson Hospital in Durham; Oteen Veterans Administration Hospital in Buncombe County; Murdoch Center for Retarded Children and John Umstead Hospital in Butner, N. C.; Dorothea Dix Hospital in Raleigh, N. C.; and Doctors Hospital in Washington, D. C.



2

Program Information

The Medical Curriculum

In recent years, analysis and appraisal of medical curricula has resulted in changes in many medical schools. Several factors have required these changes, important among them being the increasing scope and complexity of medicine generally, and the dissatisfaction with the sharp cleavage between basic science and clinical years. As a result of long study, the Duke University School of Medicine instituted a major revision of the curriculum, beginning with the class which entered in the fall of 1966.

The aims of the present curriculum are: (1) to provide a strong academic basis for a lifetime of growth within the profession of medicine, with the development of technical competency, proficiency, and the proper attitudes peculiar to the practice of medicine as well as appreciation of the broader social and service responsibilities; (2) to establish for the first year a basic science program which will fulfill the purposes of the increasingly heterogeneous student body; (3) to offer both clinical and basic science education simultaneously; (4) to permit the student to explore his personal intellectual preferences and capabilities; (5) to allow in-depth study in selected areas, either clinical or basic science; (6) to provide greater freedom of course selection and thus to encourage earlier career decision; and (7) to achieve better integration of the medical school curriculum with residency training and the practice of medicine.

The curriculum, while offering a previously unattainable degree of flexibility to medical education and new opportunities for intellectual exploration, also makes heavy demands upon the student. It should be recognized that a medical student at Duke University School of Medicine is expected to maintain a consistent level of attainment and to demonstrate qualities of initiative and dedication to his chosen profession. A scholarly attitude toward medicine that will continue

throughout an entire career is an important objective of the medical school. The foundations of this attitude to learning should accompany the student when he enters.

A student is expected to maintain at all times a professional attitude toward patients, to respect confidences, and to recognize that he is the recipient of privileged information only to be discussed within the context of scholarship and in circumstances that truly contribute to the educational process or the care of the patient. This attitude involves consideration not only of speech and personal appearance but also of morality, honor, and integrity.

A special examination will be taken annually by all medical students. The examination, comprising two 3-hour papers, is administered on a single day each year. Freshman medical students take this examination on the second day of medical school, in addition to subsequent examinations in May. The results of these examinations will be included in each student's record. In addition all students are required to take Part I of the National Board Examinations at the end of their first year of medical school.

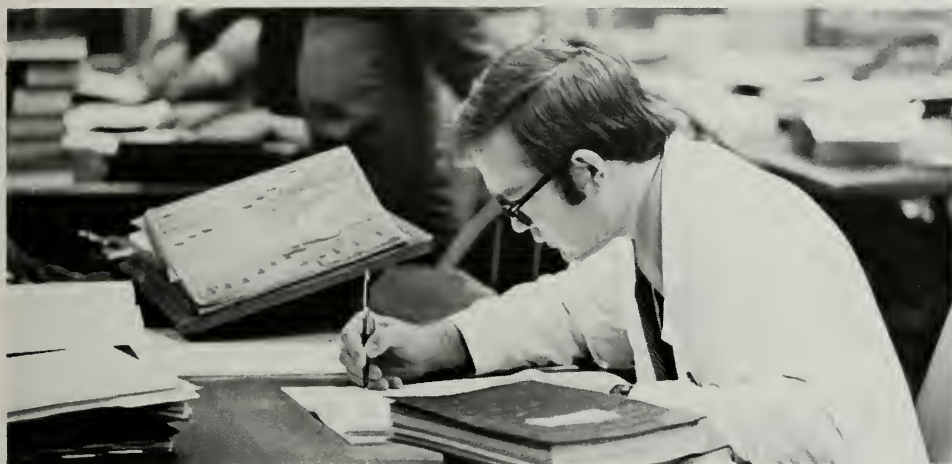
Doctor of Medicine Degree

The degree of Doctor of Medicine is awarded upon approval by the faculty of Duke University to those students who have completed the curriculum of the School of Medicine and who have demonstrated their fitness to practice medicine by adherence to a high standard of ethical behavior and morality and paid or made satisfactory arrangements to pay all indebtedness to the University.

Course Requirements—First Year. The student will study the principles of all the basic science disciplines. Rather than mastering an encyclopedic array of facts, the purpose will be to acquire familiarity with the major principles of each subject. An introduction to clinical medicine will be presented by the clinical services. The year will be divided into two terms, each of eighteen weeks, as follows:

Term 1	Hours	Credit
Anatomy	198	6
Biochemistry	157	5
Physiology	116	5
Genetics	32	2
Basic Neurological Sciences*	92	—
	<hr/> 595	<hr/> 18
Term 2		
Pathology	206	5
Clinico-Pathological Conferences	11	—
Microbiology	147	4
Pharmacology	121	4
Human Behavior	53	2
Introduction to Clinical Medicine	96	3
	<hr/> 634	<hr/> 18

*Credit is included in anatomy, physiology, and human behavior courses.



Course Requirements—Second Year. The second year will provide an exposure to clinical science disciplines, which permit the student early in his career to become a participant in the care of patients. The acquired appreciation of the problems of the clinical areas and the opportunities to recognize the applications of the basic sciences should lead to a more meaningful selection of courses for the subsequent two years. The second year will be divided into five terms of approximately seven weeks each as follows: medicine, obstetrics, pediatrics, psychiatry, and surgery.

In addition, instruction will take place in community health sciences (70 hours) and radiology (72 hours).

Course Requirements—Third and Fourth Years. These two years will be made up of elective courses, as flexible as possible within requisite limitations. Each student will select professional advisers from the preclinical and clinical faculties, who will assist the student in formulating his program for the third and fourth years. Approximately one-half the time will be spent in basic science and one-half in clinical science. Completion of the Medical Research Training Program or one of the special study programs may fulfill the requirements for basic science.

The elective courses of study offered are described under each department. The wide selection affords an opportunity for each student to design his program to satisfy best his needs in conformity with his medical future, with guidance from his advisers.

As an alternative after-completion of the second year, the student may enroll as a Ph.D. candidate in one of the basic sciences, earning this degree in two or three years. Then, having completed three of the four years necessary for an M.D., he may earn the M.D. degree by completing a fourth clinical year.

The third and fourth years will be divided into eight terms of nine weeks each. Certain courses as noted will be offered during the summer term.

Promotion. The records of each student are reviewed periodically by promotion committees comprised of the department chairmen. The Director of Medical Education acts on the recommendations received from the promotion committees and may:

1. Promote students whose work is satisfactory.
2. Warn students whose work is less than satisfactory that they must improve their scholastic endeavor.
3. Place on probation students whose work is unsatisfactory.
4. Request the resignation of any student who is considered an unpromising candidate for the degree of Doctor of Medicine.

A student wishing to appeal a decision may do so to the Director of Medical Education within two weeks of his notification.

The Director, with the advice of the Medical School Advisory Committee, reserves the right to require the withdrawal of any student at any time if, in the opinion of the majority of committee members, the student should not continue in the Medical School.



Combined M.D.-Ph.D. Training Programs

Medical Scientist Training Program. The Medical Scientist Training Program, conducted under the auspices of the School of Medicine and the Graduate School, is designed for highly qualified students. The program requires six to seven years of study leading to the M.D. and Ph.D. degrees. It is probable that the graduates of this program will pursue either careers in teaching and research in one of the basic medical sciences with an understanding of clinical medicine or will continue residency training with a background in basic science which fosters research careers in clinical medicine.

Eligibility. Applicants must meet the requirements for admission to both the Medical School, as a candidate for the M.D. degree, and the Graduate School, as a candidate for the Ph.D. degree. In addition to the minimum requirements for acceptance in the Medical School and the Graduate School, course work in science and mathematics as well as research experience will count heavily in the selection of candidates.

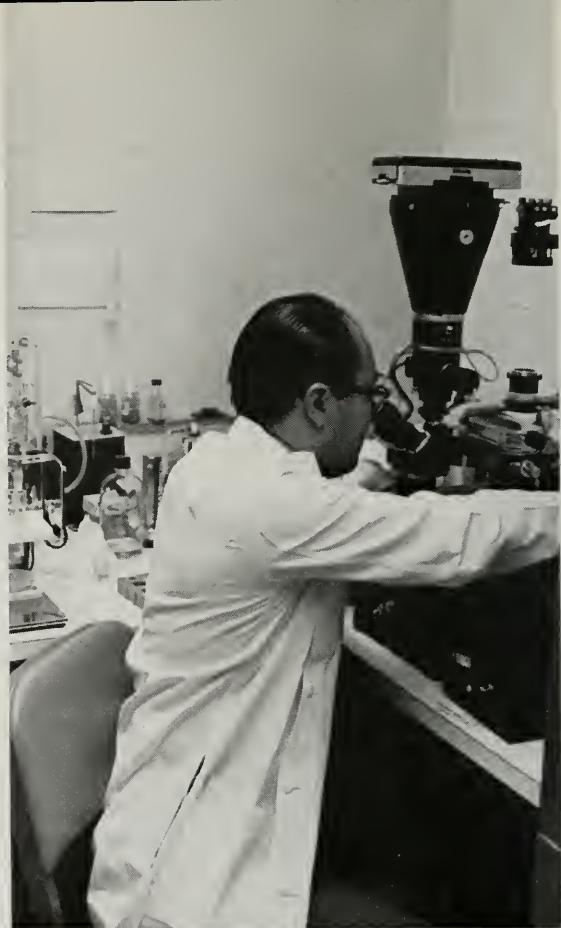
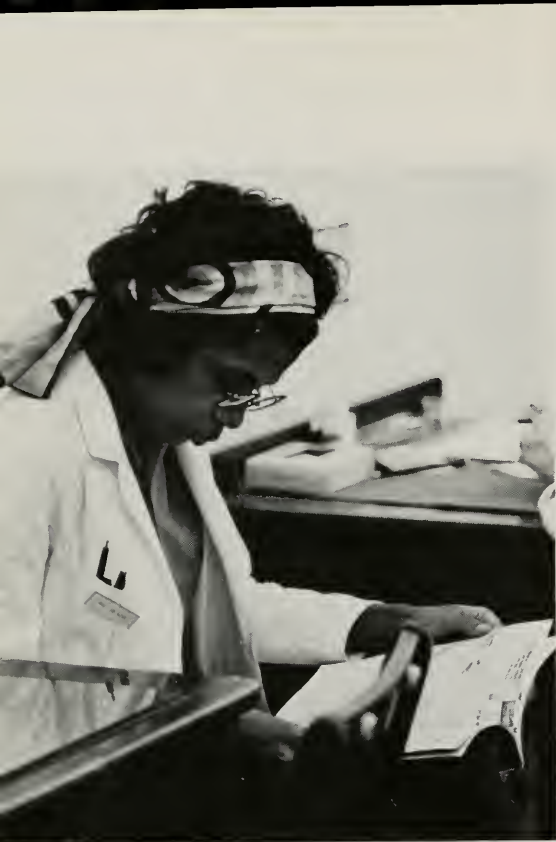
Financial Support. Those students funded will be offered a traineeship award (MSP trainee) which includes stipends plus full tuition. The stipend levels are equivalent to the current U. S. Public Health Service predoctoral and postdoctoral fellowships, and an MSP trainee will be supported until he has completed both degrees, as long as his progress is satisfactory. Stipends begin at \$2,400 plus \$500 per dependent.

Candidates may also participate in the Medical Scientist Training Program without receiving one of the special traineeship awards. Details of alternate awards available will be discussed with candidates on an individual basis.

The Training Program. This program has been designed to offer students great latitude in the selection of course material. Basic requirements are two academic years composed of the core basic science year and the core clinical science year of the curriculum for medical students at Duke University. Following completion of the second year, the student enters the graduate program to complete the requirements for the Ph.D. degree. One more academic year of clinical training is necessary to complete the requirements for the M.D. degree.

The first year—core basic science year—is comprised of basic sciences: anatomy, biochemistry, genetics, microbiology, pathology, pharmacology, and physiology. An introduction to clinical methods concludes the first year. Students in the Medical Scientist Training Program work together throughout the first year, following which they select their field of graduate study. During the summer between the first and second years, students may elect courses in mathematics, chemistry, or other fundamental sciences; begin graduate research; or begin the second year clinical rotation.

The second year—core clinical science year—encompasses a comprehensive approach to medicine, oriented to the patient as a whole. During this year, which represents the student's first introduction to clinical medicine, the curriculum is "vertically" integrated, multidisciplinary, and interdepartmental. Biological processes—from conception through birth, development, and maturation to senescence and death—will be emphasized. Special consideration is devoted to the pattern of individual developmental sequence, to the changes in the pattern determined by genetic composition, and by the particular environment in which the patient lives.



During the second year, the trainee will be taught primarily by one specific group of teacher-investigators from the clinical departments. The program consists of a special series of seminars, demonstrations, and clinical experiences which parallels the seminar series insofar as possible. For convenience in description, these clinical experiences have been roughly divided into periods. In practice, the entire year will be organized as a unit.

Initially, six weeks are devoted to obstetrics and gynecology followed by two weeks of interdisciplinary training in the Departments of Pediatrics and Obstetrics.

The next six weeks is devoted to pediatrics, with emphasis on normal development and the aberrations caused by disease. Time will be allotted to a combined effort of all departments in the area of adolescence, including such social problems as juvenile delinquency.

The Departments of Medicine, Surgery, and Psychiatry cooperate in the teaching program during the last twenty-one weeks of the year. Selected patients from the medical and surgical services will be maintained on a "mixed" ward to facilitate and improve this phase of the student's clinical experience. The different types of patients also provide an excellent opportunity for psychologists, social workers, and others to demonstrate the importance of their respective disciplines and attitudes for these patients. Finally, opportunities are provided for students to study problems of senescence and the impact of chronic disease upon the individual and his family.

During the third, fourth, and fifth and, if necessary, sixth year of the program, the student will pursue graduate study in order to satisfy the requirements for the Ph.D. degree. These requirements include: (1) completion of necessary

course work, (2) adequate performance in the preliminary examination, (3) original research suitable for a dissertation, and (4) successful defense of the thesis in the final examination. Detailed description of other general requirements for the Ph.D. degree are stated in the *Bulletin of the Graduate School*.

The graduate curriculum of each student will be worked out in consultation with the director of graduate studies of the department in which the student chooses to work and will require the approval of the Medical Scientist Training Committee. Since most of the ordering ideas and experimental techniques of all of the medical sciences derive from mathematics and the physical sciences, it is essential to ensure that all students in the program have an adequate foundation in these subjects. Because of the close working relationship and geographical proximity of the medical science and physical science departments at Duke, the setting is unusually favorable for the achievement of that goal.

Descriptions of graduate courses in the Departments of Anatomy, Pathology, Microbiology, Biochemistry-Genetics, and Physiology and Pharmacology are listed in the *Bulletin of the Graduate School*. Students will be encouraged to select courses which are relevant to their own developing individual interests rather than according to a prescribed program which is applied to all students in a given discipline. It is our view that such range, flexibility, and freedom are the essence of graduate education. The original research and dissertation of each student will be supervised by a faculty adviser chosen by the student in consultation with the director of graduate studies in his department. The faculty adviser is the chairman of the student's supervisory committee which must consist of at least three members from the major department. This committee generally administers preliminary (before commencing original research) and final (after completion of dissertation) examinations for the student.



During the terminal year—an elective year in clinical science—the student will be assigned an adviser from the clinical department in which he is most interested. The student and his adviser will construct a highly individualized training plan, one that has a major emphasis relative to the chosen clinical area as well as minor emphasis in one other field. The integration of research and clinical experience will be carried out in such a way that the student's research competence will be facilitated. Therefore, this year will be planned with due regard to the trainee's proposed career in research. This year should give the trainees in the Medical Scientist Training Program further training in clinical medicine and should complement the second or core clinical year, so that the trainee's total clinical experience would approximate that now given in the regular clinical years of medical school (the third and fourth years in the majority of schools). It should be noted that since these students will receive the M.D. degree upon completion of this final year, great care will be taken by the faculty to ensure that students will be knowledgeable in the current concepts of patient care.

Parenthetically, it is hoped that the student's last year would give him an experience which will not be repeated later during his internship. Rather it should serve to complement these phases of his training. Ideally, the future surgeon, for example, should be exposed to fields other than surgery, since he will receive intensive training in surgery during his residency. The student usually will be tempted to enter immediately upon the area of his primary interest, e.g., surgery, and to offset this tendency partially, it is stipulated that a student should take a major and minor subject and that the program for the final year should be arranged through consultation by the student with his faculty adviser.

Application and Admission Procedures. The following are procedures which each student must follow in applying to the Medical Scientist Training Program.

1. Complete the application form for the Duke University School of Medicine.
2. Complete the application form for the Medical Scientist Training Program.
3. After preliminary screening, selected candidates will be asked to submit an application to the Graduate School.
4. A member of the Medical Scientist Training Committee will be available to furnish further information to applicants interviewed at Duke. Applicants will be notified of their status during January-February-March.

Additional information may be obtained by writing the Associate Director, Medical Scientist Training Program, Department of Biochemistry, Duke University Medical Center, Durham, North Carolina 27710.

The Medical Historian Training Program. The Medical Historian Training Program is conducted under the auspices of the School of Medicine and the Graduate School to provide professionally trained medical historians. A minimum of six years of graduate study is required. Upon satisfactory completion of the program, the Doctor of Medicine and Doctor of Philosophy degrees will be awarded. It is anticipated that graduates will undertake a minimum of one year of post-graduate medical training, following which their major effort will be in teaching and scholarly activities (in the field of the history of medicine), with minor clinical responsibilities.

Basic requirements are two academic years in the School of Medicine consisting of "core" basic sciences in the first year ending with the course *Introduction*

to *Clinical Medicine*, and “core” clinical sciences during the second year, following which the student enters the Department of History in the Graduate School.

Candidates for the Ph.D. degree in history devote approximately two full years to the completion of their required courses, work in seminars, and in preparatory study for their preliminary or qualifying examinations. The actual length of time needed to earn the Ph.D. degree depends upon the number of years beyond this two-year period candidates find necessary for research and writing of their dissertations. Candidates will pursue studies in the Department of History during the third and fourth academic years of the program. In the fifth and sixth years, the student should have one year in which to pursue medical-historical research and one year of elective courses in the School of Medicine to fulfill the requirements for the M.D. degree.

Application and Admission Procedures. Applicants must meet the requirements for admission to the School of Medicine and the Graduate School in the Department of History. Candidates who have completed two years of medical school will also be considered.

In addition to the minimum requirements established by the School of Medicine and the Graduate School, courses in history and in the history and philosophy of science will count heavily in the selection of candidates.

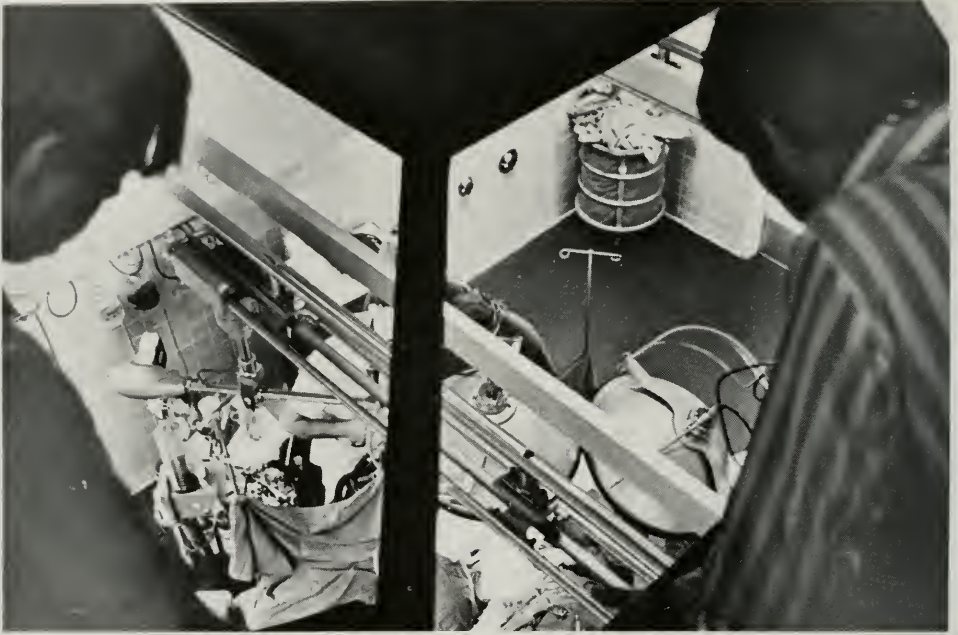
Applicants should complete and submit an application form to the Duke University School of Medicine. After preliminary screening, selected candidates will be requested to submit an application to the Graduate School for admission to the Department of History.

Additional information may be obtained by writing to Gert H. Brieger, M.D., Ph.D., Director, Medical Historian Training Program, Box 3702, Duke University Medical Center, Durham, North Carolina 27710.

The M.D.-J.D. Training Program

The School of Medicine and the School of Law of Duke University have jointly established a unique program of combined medical and legal education. The aim of the program is to provide to a small number of selected individuals the opportunity to acquire a full education in both medicine and law during a six year course of closely integrated study in the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.D. and the J.D. degrees.

Objectives. The Duke M.D.-J.D. Program seeks to develop a new breed of dual professional who is well grounded both in law and medicine and who can function usefully in any one of numerous academic, governmental, or private professional capacities, in areas of overlap between the two disciplines. Although the traditional meeting ground between law and medicine has been in the courtroom in connection with personal injury and malpractice litigation, entirely new areas of medical-legal interaction have developed in recent years. The program seeks to concentrate its interest and efforts in these emerging fields. The program will thus focus on the legislative and regulatory developments concerning various aspects of medicine and on the role of law in structuring health care delivery systems and in defining the rights and responsibilities of the participants therein. Another important area of concentration will be that of law and psychiatry.



Career Opportunities. The M.D.-J.D. Program will take a keen interest in its graduates and will assist them in finding ways of employing their special skills. It is considered likely that most graduates of the program will take a medical internship before electing a career role as either a physician or a lawyer, using his other professional training as a useful adjunct in the specialty selected. The program reflects the belief that promising career opportunities will be available to graduates of the program, especially in governmental agencies and in universities.

Course of Study. The student in the M.D.-J.D. Program begins his six year course of study in the School of Medicine. As in the regular M.D. program, his first year is devoted to the basic medical sciences and the second year to the basic clinical disciplines. At this point the student switches to the School of Law, where his first year curriculum is the same as that of other law students. During the next two years he selects courses in the Law School which are of special application to his medical-legal interest, and his sixth and final year is spent in elective clinical work in the Medical School, which may be tailored to his specialized needs. In addition, the student will be required to complete additional elective basic science work amounting to eighteen hours or two summer sessions. His other summers will be unscheduled, but opportunities will be presented to engage in medical-legal endeavors suited to his developing interests.

Throughout the six year program the student will have available to him the counsel of faculty members of the two schools to help him in the selection of courses and in the definition of his career objectives.

Eligibility. Applicants for the M.D.-J.D. Program must qualify for admission to both the School of Medicine and the School of Law. In addition, they must apply specifically for admission to the M.D.-J.D. Program, and applications will be passed upon by the Joint Law-Medicine Committee, which is composed of faculty members from the two schools. Personal interviews will be required.

Because of the special intellectual demands involved in mastering two professions, high standards will be applied in admitting students to the program. Students will also be evaluated on the basis of motivation and demonstrated interest and likely achievement in the fields relevant to the program's concerns.

In view of the highly specialized character of the field, it is anticipated that enrollment in the program will be limited. Probably no more than three students will be accepted in any one year.

Financial Support. At the present time, no special financial aid is available to the students enrolled in the M.D.-J.D. Program. However, the regular loan and scholarship resources of the respective professional schools are available to students while they are enrolled. The program is of such a nature that students might find it possible to obtain support from special sources for their education in this field. The University will assist in seeking out such funds and will support students in their applications.

Application Procedure. Application forms for the M.D.-J.D. Program and additional information regarding this program may be obtained by writing to the Director of the M.D.-J.D. Program, Duke University Medical Center, Durham, North Carolina 27710, and to the admissions offices of the Schools of Medicine and Law.

The M.D.-M.P.H. Training Program

Students enrolled in the School of Medicine upon satisfactory completion of the first two years of the regular curriculum may arrange to obtain a Masters of Public Health degree at the University of North Carolina, Chapel Hill or at another approved institution. The program is designed to train physicians in epidemiology and in planning, administering, and evaluating health care delivery systems. Upon receipt of the degree, students are awarded 18 basic sciences credits and 18 clinical credits toward satisfaction of requirements for the M.D. degree.

For additional information interested students should contact the Chairman, Department of Community Health Sciences, Duke University School of Medicine, Durham, North Carolina 27710.

Special Interdisciplinary Training Programs

A series of integrated, interdisciplinary training programs have been constructed for medical students with particular interests in certain biomedical sciences. These programs may be selected by students for their third and fourth years in lieu of an all elective program individually selected. Refer to the chapter on Courses of Instruction for the specific programs.

Internships and Residencies

Straight internships of one year duration are available in the Departments of Medicine, Pathology, and Pediatrics. Appointments are from July 1 through June 30 with few exceptions. Interns receive stipends, professional liability insurance, uniforms, and laundry of uniforms.

Residencies offered with the chairman or chief of each service are as follows:

Anesthesiology.....	(Chm.) Merel H. Harmel, M.D.
Internal Medicine.....	(Chm.) James B. Wyngaarden, M.D.
Dermatology.....	J. Lamar Callaway, M.D.
Neurology.....	Stanley H. Appel, M.D.
Obstetrics and Gynecology.....	(Chm.) Roy T. Parker, M.D.
Ophthalmology.....	(Chm.) Joseph A. C. Wadsworth, M.D.
Pathology.....	(Chm.) Thomas D. Kinney, M.D.
Pediatrics.....	(Chm.) Samuel L. Katz, M.D.
Pediatric Allergy.....	Susan C. Dees, M.D.
Pediatric Cardiology.....	Madison S. Spach, M.D.
Psychiatry.....	(Chm.) Ewald W. Busse, M.D.
Radiology.....	(Chm.) Richard G. Lester, M.D.
Diagnostic Radiology.....	(Chm.) Richard G. Lester, M.D.
Nuclear Medicine.....	(Chm.) Jack K. Goodrich, M.D.
Therapeutic Radiology.....	Patrick J. Cavanaugh, M.D.
Surgery.....	(Chm.) David C. Sabiston, Jr., M.D.
General Surgery.....	William G. Shingleton, M.D.
Neurosurgery.....	Guy L. Odom, M.D.
Oral Surgery.....	Nicholas G. Georgiade, D.D.S., M.D.
Orthopaedic Surgery.....	J. Leonard Goldner, M.D.
Otolaryngology.....	William R. Hudson, M.D.
Plastic Surgery.....	Kenneth L. Pickrell, M.D.
Thoracic Surgery.....	Will C. Sealy, M.D.
Urologic Surgery.....	James F. Glenn, M.D.

Duke University Medical Center is a participating member of the National Intern and Resident Matching Program, 2530 North Ridge Avenue, Evanston, Illinois, and all applicants must register with this program. The Hospital is a member of the American Hospital Association approved by the American Medical Association for internship and residency training, and the Joint Commission on Accreditation of Hospitals.

Both men and women graduates of any Class A Medical School are eligible for appointments. Internships are rarely available to graduates of medical schools outside the United States and Canada, but a limited number of residencies and research fellowships are available following certification by E. C. F. M. G. (Educational Council on Foreign Medical Graduates, 1710 Orrington Avenue, Evanston, Illinois). All applicants will be considered without regard to race, color, religion, sex, or national origin.

The Durham Veterans Administration Hospital adjoins the Duke University Campus and is operated under the supervision of the Vice President's Committee of the Duke University Medical Center. The full-time professional staff of the V.A. Hospital are all faculty members of the School of Medicine. All training programs are integrated with corresponding programs at Duke University Medical Center including rotation of house officers at each hospital.

All interns, residents, and clinical fellows are required to be licensed by the State of North Carolina. This may be accomplished by (1) a residency training license (fee \$10.00) that covers only training at Duke and is not convertible to a full North Carolina license and (2) a full North Carolina license (fee \$100.00) that is a complete medical license obtained either by State Boards or National Boards and is fully reciprocal with other states for full licenses. Duke Medical

Center cannot make applications for house staff. Since house staff members should have the license before beginning duties, arrangements for the license should be made in advance. For additional licensure information, contact Dr. Joseph J. Combs, North Carolina State Board of Medical Examiners, 222 North Person Street, Raleigh, North Carolina 27601.

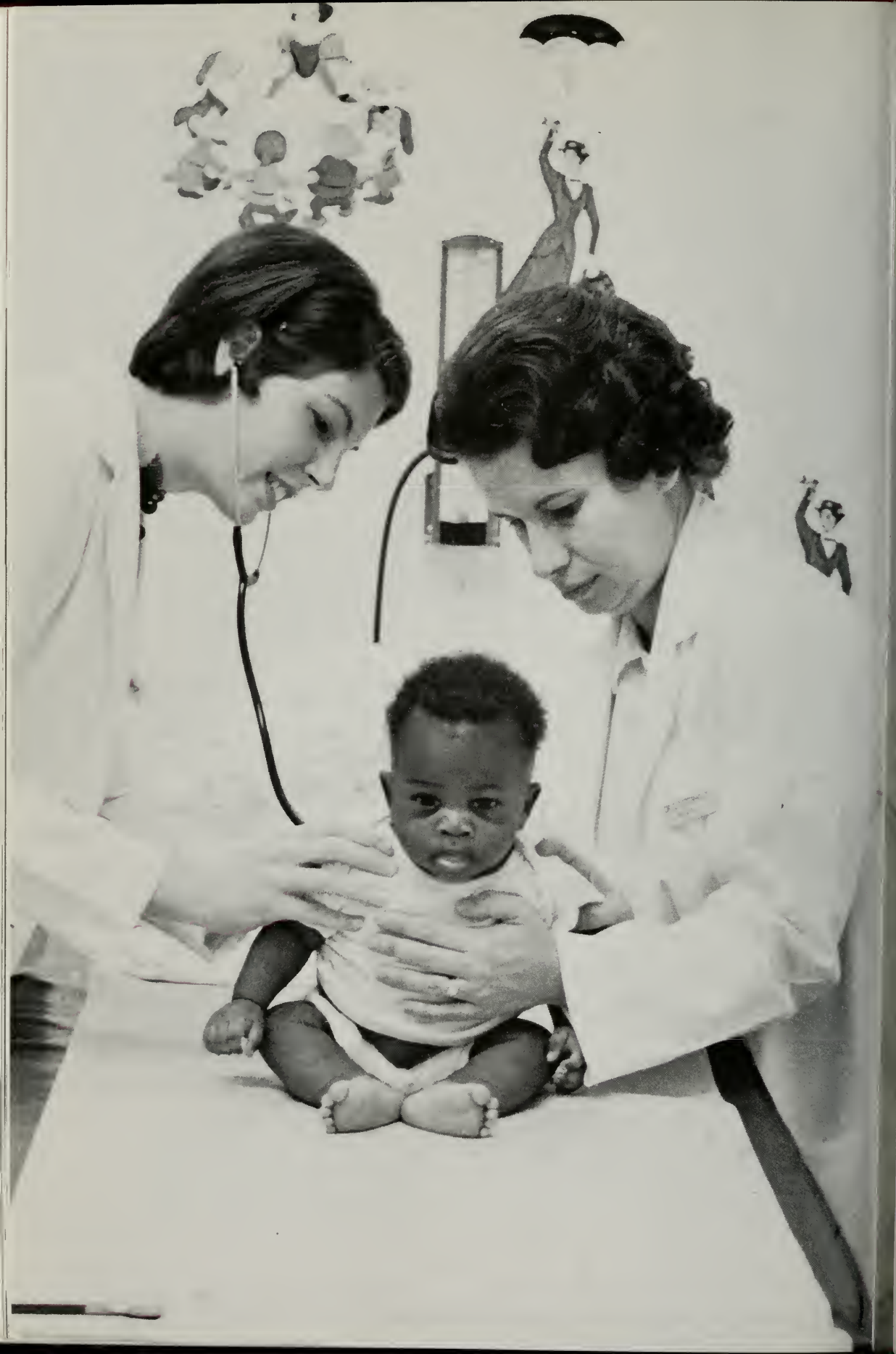
Application forms and information for internships, residencies, or fellowships may be obtained by writing the chairman of the appropriate department, Duke University Medical Center, Durham, North Carolina 27710.

Continuing Medical Education

Numerous formal postgraduate courses are given throughout the entire year for physicians in general practice as well as in all specialties. Conferences and tutorial seminars are also available to any physician who desires to attend and participate. Physicians in practice may make arrangements for a period of one day or more for courses tailored to their particular interests. These personal contacts with senior faculty and residents, including patient examinations as well as follow-up care, provide in-house training experience.

The annual one-week course held in Atlantic Beach in mid-July continues to be one of the most well attended programs in the region.

For additional information, please contact William J. A. DeMaria, M.D., Associate Director, Continuing Education, Duke University School of Medicine, Durham, N. C. 27710.



3

Student Life

The University

Duke University located in Durham, North Carolina, has an enrollment of 8,944 students from all fifty states and many foreign countries. Currently Trinity College, The Woman's College, the Graduate School, and the Schools of Business Administration, Divinity, Engineering, Forestry, Law, Medicine, and Nursing constitute the University.

Durham, with a population of approximately 100,000, is in the Piedmont region of North Carolina, which has easy access to the sea coast and mountains. It is one of the three cities bounding the Research Triangle Park where numerous private research laboratories and governmental agencies are located. Duke University is twenty-five miles from North Carolina State University in Raleigh and eight miles from the University of North Carolina (UNC) in Chapel Hill.

Conduct of Students

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as are currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations, or for conduct adjudged unsatisfactory or detrimental to the University.

Living Accommodations

Housing. Duke University maintains residence halls consisting of (1) the Graduate Center which accommodates 148 male graduate students, 56 female

graduate students, and 117 undergraduate women in single and double rooms. Commons facilities include the dining halls and a lounge with color TV. (2) Hanes Annex, located on the West Campus, has room for a limited number of graduate and professional school students and senior residents. (3) Town House Apartments, located between East and West Campuses, are limited to graduate and professional school students. There are 30 units, each of which consists of one double bedroom, one single bedroom, kitchen and one and one-half bathrooms. These units are air-conditioned and a swimming pool is available.

The campus bus provides transportation to Town House Apartments and all parts of the University.

Duke provides no housing for married graduate and professional students. However, the Department of Housing Management is prepared to assist the married graduate and professional school students in locating suitable housing in Durham. There are many relatively new complexes and a few older apartments. For information on residence hall accommodations and in locating off-campus housing, contact the Department of Housing Management, Duke University, Duke Station, Durham, N. C. 27706.

Dining Facilities. The Medical Center cafeteria serves students and employees. Other dining facilities located near the Medical Center are in the Union Building, with two cafeterias and the Oak Room, and in the Graduate Center, with a cafeteria and coffee lounge. The latter serves sodas and sandwiches from 11:30 a.m. to 11:00 p.m. (Please refer to section on Dining Facilities in the chapter on Financial Information for approximate food costs.)

Services Available

Student Personal Advisory Program. One important objective of Duke University School of Medicine is to promote an informal, cordial student-faculty relationship. All entering students are given an opportunity to request a personal adviser who will be available to the student throughout his undergraduate medical training. Advisers are assigned from a group of faculty members who have volunteered to serve in this capacity.

Student Health Service. A special health program for medical students has been established because of their unique health needs due to activities which bring them into greater contact with communicable disease than the average university student. The program provides a physical examination, chest X-ray, blood and urine examination, and necessary immunizations at the beginning of the freshman year. Chest X-rays will be repeated at appropriate intervals during the training period and all services of the Duke University Medical Center are available.

The main components of the Health Service include the Student Health Clinic in the Marshall I. Pickens Rehabilitation Center, located at the corner of Trent Street and Erwin Road, and the Infirmary on the East Campus. For treatment of most illnesses or injuries, students should first contact the Student Health Clinic. Transportation may be made via the campus bus, or emergency transportation can be obtained from the Duke Campus Police or the Durham Ambulance Service. Whenever possible residents should be consulted for assistance in obtaining emergency treatment.

The following services are provided:

1. Unlimited outpatient visits to the Student Health Clinics.
2. Routine laboratory and X-ray examination needed to diagnose acute illness or injury.
3. Hospitalization in either Duke Hospital or the Infirmary for treatment of acute illness or injury. (Limited to a maximum of thirty days per regular semester, six days per summer session). Special duty nurses, if required, will be provided at the student's expense. If students have insurance providing hospitalization, surgical, or medical benefits, the benefits shall be applied to the cost of their medical care.
4. Most drugs required for the treatment of acute illness or injury. Students will be charged for drugs not provided by the Health Service and will be so informed, generally in advance. Blood transfusions are provided at extra expense.
5. Consultations with specialists in the Duke University Medical Center as required for the diagnosis and treatment of acute illness or injury. Such consultation visits *must be authorized by a Student Health Service physician in advance*, except in emergencies.
6. Immunizations as required for the general protection of the student body will be provided free of charge. Immunizations required for other reasons (travel abroad, employment, etc.) can be arranged at cost. Clarification on this point can be obtained at the Health Service.

The following services are excluded:

1. Routine eye examinations, lens prescriptions, or care of contact lens problems. Treatment for acute eye disease or injury is, of course, provided.
2. Routine dental care. Emergency treatment for infection or pain is provided on a limited basis.
3. Skin disease other than of acute or disabling nature.
4. Elective treatment or elective surgery. This is sometimes difficult to define categorically. Students are urged to discuss their individual problems with Health Service physicians *before* assuming that a certain problem will or will not be cared for through the the Health Service.
5. Treatment of pre-existing or chronic conditions. Again, definitions can be difficult, and discussion is encouraged.
6. Private physicians' fees other than consultation fees authorized through the Student Health Service. Students always have the option of employing private physicians of their own selection, and those with known and pre-existing medical problems are encouraged to do so. However, students are financially responsible for special care by a private physician.
7. Treatment of accidents or illnesses occurring during vacations or while off campus. A special commercial policy limited to regularly enrolled Duke students furnishes complementary protection, if desired.
8. Care of dependents or conditions related to pregnancy.
9. Long-term psychiatric care. Acute psychiatric care requiring hospitalization is provided and is subject to the same limitations as for other illnesses. *Advisory psychiatric consultation* on an outpatient basis is available at no extra expense to students through the Student Health Service.

Information concerning the availability of additional health care may be obtained from the Student Health Service. These rules and regulations are those in effect at the time of publication of this document, but are subject to change at a later date.

Student and Professional Organizations

Alpha Omega Alpha. Alpha Omega Alpha Honorary Medical Fraternity was organized nationally in 1902 and the Duke Chapter (North Carolina Alpha) was chartered in 1931. The aims of this society are the promotion of scholarship and research in medical schools, the encouragement of high standards of character and conduct among students and graduates, and the recognition of high attainment in medical science, practice, and related fields. Students who have demonstrated

leadership and academic promise of future achievement are elected. Membership is limited to no more than one-sixth of any class and of these only one-third may be elected in the junior year. Alumni, faculty, and honorary membership may also be conferred upon certain physicians who have distinguished themselves in the various areas of medical teaching, research, and practice.

Davison Society. All medical students are members of the Davison Society which was formed several years ago by merging the Student Government Association and the Duke Chapter of the Student American Medical Association (SAMA). The Davison Society, governed by a council of elected officers and representatives, is involved in many community and Medical Center projects including: (1) community health clinics, (2) community drug and sex education programs, (3) student-faculty curriculum evaluation and modification, (4) preservation of the Honor Code, (5) freshman orientation, (6) participation in the Davison Scholar Program, (7) organization of extracurricular, educational, and social events for students and faculty, and (8) publication of a Directory of Students and a list of research opportunities. The organization has earned a reputation on a national level for its interest in medical education and community projects.

The current honor-pass/fail grading system with written evaluations is the result of recommendations proposed by faculty and students in the Davison Society. This system provides students with better feedback and more useful data for their development as physicians inasmuch as written evaluations are objective, frank, and comprehensive.

Students are active in community health affairs, such as the Edgemont Clinic, a free clinic which was opened in 1969 and operated by medical students from Duke University and the University of North Carolina. Students in other health professions also participate. The clinic operates under a Board of Directors composed of residents in Edgemont, an area populated by low income black and white families. The clinic, open two evenings a week, is supported by the North Carolina Regional Medical Program and voluntary donations from individuals and organizations. Although this clinic provides valuable experience, no course credit is given. Students also organize and teach sex and drug education programs in junior high schools in Durham.

Students also may elect optional membership in SAMA (Student American Medical Association). Approximately 75 percent of the medical student body are members of SAMA, an organization representing the opinions and recommendations of more than 50,000 medical students, interns, and residents throughout the country. Davison Society officers who are SAMA members represent the School of Medicine at regional and national student professional meetings and conventions. Members of the Duke Chapter have always been very active in the national organization with many serving as committee chairmen as well as on standing and ad hoc committees.

A SAMA community internship program for medical students is administered by appointed members of the Davison Society. SAMA provides benefit plans for students and maintains communication with other national student professional organizations.

The Student National Medical Association, Inc. The Student National Medical Association (SNMA) is a national organization comprised of medical students. The organization was established in 1964 and now has chapters at sixty-seven of the American medical schools.

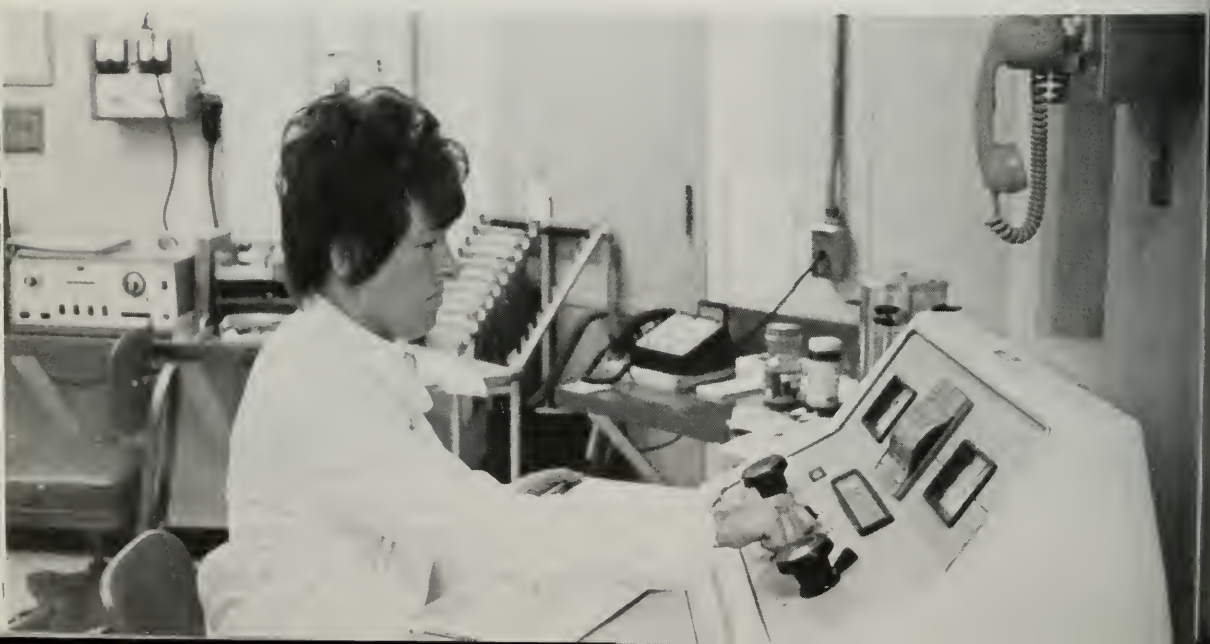
The purposes of the Student National Medical Association are: (1) to create an atmosphere wherein professional excellence and moral principles can find fullest expression, (2) to disseminate information relative to minority problems within the field of medical education, (3) to take necessary and proper steps to eradicate prejudicial practices in the field of medical education and related areas as these practices appear to be based on race, creed, color, sex, or national origin, (4) to develop workable programs for the implementation of better urban and rural health care, (5) to provide national leadership in the promulgation of legislative policies for the provision of better health care, (6) to sponsor programs for minority youth to encourage their entrance into the health professions, and (7) to raise the levels of black student recruitment, admissions, and retention in schools training health care professionals.

The Engel Society. The Engel Society, established in 1966 as a memorial to Professor Frank L. Engel, is designed to promote intellectual and social interaction between students and faculty. Membership is limited to six junior students and six senior students who have demonstrated an inquisitive nature, interest in their fellow man, and high scholastic ability. Four faculty members are selected annually by members of the society for three-year terms.

Six dinner meetings with guest speakers are held at Quail Roost Conference Center each year. Other students may be invited to participate.

Ganglion. The Duke Neurosciences Society (the Ganglion Society) seeks to promote interest in the neurosciences and to facilitate communication between individuals studying and working in this multidisciplinary field. To accomplish this, the Society publishes *The Neurotransmitter*, a weekly bulletin of local events in the neurosciences both basic and clinical, and sponsors biweekly informal evening discussion sessions featuring both local and visiting scientists and clinicians prominent in one or more areas of the neurosciences. Membership and participation in these activities is open to anyone with an interest in the neurosciences.

Duke University Medical Alumni Association. The Duke Medical Alumni Association currently consists of over 5,000 members including all graduates of the Medical School, past and present faculty, and all past and present house of-



ficers of Duke Hospital including those who are not Duke Medical School graduates. Associate membership is available to alumni of other Medical Center programs. A newsletter is sent to all members quarterly each year. Around clusters of five-year classes, November reunions are held annually in Durham. Alumni groups have been organized in several states where luncheon and dinner meetings are held following the American Medical Association, the Southern Medical Association, the North Carolina Medical Society, and the American Academy of Pediatrics meetings.

Officers. President: Herbert D. Kerman, M.D., 1942, Daytona Beach, Florida; Secretary-Treasurer: Jay M. Arena, M.D., 1932, Durham, North Carolina.

Awards and Prizes

Roche Award. This award is a gift from the Roche Laboratories and is presented to one member of the senior class for outstanding achievement during his career in medical school.

Lange Medical Publications Awards. Two seniors selected by participating medical schools for excellence in their work are awarded four books, published by the Lange Medical Publications. The books are selected by the individual recipients.

Thomas Jefferson Award. This award, consisting of \$100, a certificate, and a book, is given to students who are outstanding in fields other than medicine and science. Periodically, it is given to those students who have materially contributed to the University. The award is not necessarily given each year.

Upjohn Award. The award is \$200 cash and a certificate presented to a Duke medical student for the best essay discussing some aspect of the social, cultural, economic, or other parameters of health.

Davison Scholarship. The Davison Scholarship award consisting of \$500 donated by Wilburt C. Davison, Dean Emeritus, is awarded to enable a medical student to participate in clinical science outside the United States. Any student may apply for this award.

C. V. Mosby Book Award. Each class president is presented a certificate to select a Mosby book not to exceed \$30.

Dermaquizz Award. The Division of Dermatology donates a book and certificate to students who attain the highest scores in a special dermatology quiz.

Merck Award. A *Merck Manual* is presented to outstanding medical students selected by a committee. The recipients' name is imprinted in gold on the book.

Trent Prize. An annual award of \$100 is given to a Duke medical student for the best essay on any topic in the history of medicine and allied sciences. Mrs. Mary Trent Semans established this award in memory of the late Josiah C. Trent to encourage students to undertake independent work in the history of medicine and to utilize the resources of the Trent Collection.



4

Admission

Admission Procedures

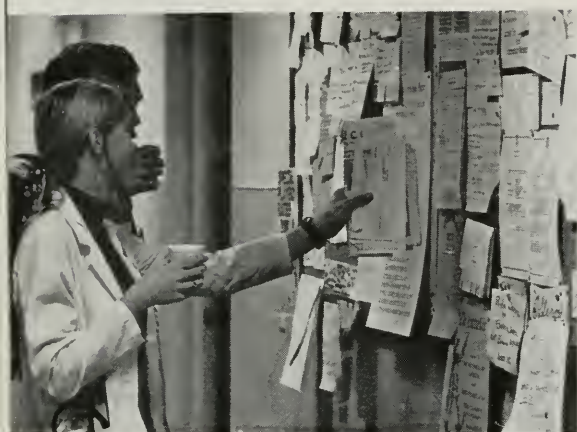
A well rounded general education is recommended with the choice of subjects beyond those required for admission governed by individual interests. The manner in which the college years are utilized is of greater importance than specific subjects. Premedical students should secure a knowledge of the principles and appreciation of the interrelationship of basic sciences, learn to work independently, observe critically, and analyze rather than store information.

Good study habits, intelligence, character, and integrity are essential qualifications for admission.

Application for Admission. Application forms for the Duke University School of Medicine may be obtained by writing The Committee on Admissions, Box 3710, Duke Hospital, Durham, North Carolina 27710. Prior to August 1, all requests for application materials will be assigned to a mailing list. The materials will be forwarded during the first week in August. The deadline for receipt of completed applications is December 1.

Requirements. Admission to the School of Medicine requires a minimum of 90 semester hours of approved college credit including one year of college English, consisting primarily of expository English composition, one year of inorganic chemistry, one year of organic chemistry, one year of physics, one year of biology and/or zoology, and one year of calculus. All science requirements must be completed not more than seven years prior to entrance.

The Medical College Admission Test administered by the Psychological Corporation, 304 E. 45th Street, New York, New York 10017, is required of all applicants. This test is given in May and October of each year at numerous colleges throughout the United States. Students should consult their premedical advisers and arrange to take this test in May of the year they plan to submit applications for admission.



Selection

Selection is made between September 15 and March 15 for students entering the following September. Data on each candidate are carefully evaluated by the Committee on Admissions. If the distance is not too great, a personal interview will be conducted at Duke for those students with satisfactory credentials. Other candidates will be referred for personal interviews with regional representatives of the Admissions Committee. Those candidates who demonstrate the most promise for exceptional performance in their future practice of medicine are admitted on the basis of merit without regard to race, color, religion, sex, or national origin and are notified as soon as possible whether or not they have been accepted. In order to ensure enrollment, accepted candidates must send returned signed agreement sheet within three weeks after notification. Inasmuch as admission is offered a considerable period in advance of matriculation, it is provisional upon the successful completion of remaining required premedical college courses.

Transfer

Applicants who have completed two years in most of the American and Canadian Medical Schools will be considered for transfer only as space permits.

Such transfer students are required to complete the second and fourth years of the Duke curriculum. For transfer, successful completion of Part I of the National Board Examination is required as evidence of satisfactory completion of subjects taught in the first two years of most North American schools.

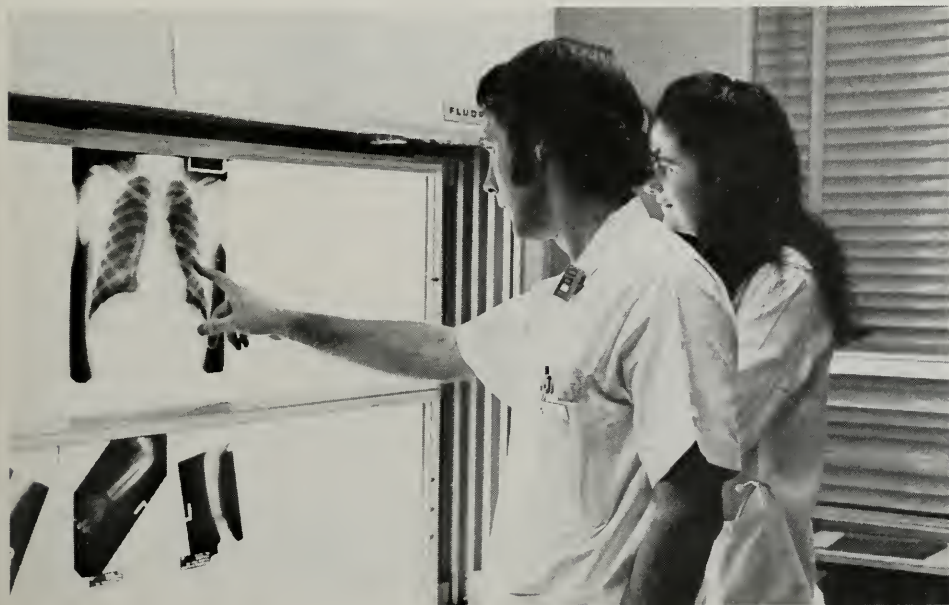
A limited number of transfer students from foreign medical schools may be admitted each year. Such students should have completed their preclinical training and must successfully complete Part I of the National Board Examination. If space permits, these students will be admitted as members of the sophomore class and rotate in the clinical departments. They will be required to complete the junior and senior years, composed of electives in clinical and preclinical sciences. By attending two summer sessions, a transfer student from a foreign medical school can earn his M.D. degree from Duke University approximately two and one-half years after matriculation.

Transfer application materials must be requested by January 15 of the year of anticipated transfer. The deadline for the receipt of completed applications is March 15 of the same year. Competitive applicants will be sponsored for Part I of the National Board Examinations given in June of that year as part of the evaluation procedure. Upon receipt of the results of this examination, personal interviews will be arranged for those with satisfactory credentials.

Transfers into the freshman or senior years are not permitted.

Advanced Placement

Advanced placement is offered to qualified freshmen students on an optional basis for the following first semester courses: anatomy, biochemistry, genetics, and physiology. Students desiring consideration for advanced placement are required to take examinations in applicable subjects during the first week of medical school. Those who are granted and accept advanced placement for a specific course are not required to enroll in that course but will be responsible for arranging mutually satisfactory substitutions with the appropriate department chairman.





Students who have been awarded Ph.D. degrees in biomedical or preclinical sciences may apply for a three-year program to obtain their M.D. degrees. This program consists of the regular "core" basic science courses required of all freshmen medical students, "core" clinical rotation during the second year, followed by senior class clinical electives.

Summary

Three years of college work, twenty dollars (\$20) nonrefundable application fee, the return of a signed agreement sheet within three weeks of notification of acceptance, and the Medical College Admission Test are required. The number of students in the 1972-73 freshman class is 114.

Applications for admission must be received between August 1 and December 1, 1972. Students will be notified between October 1, 1972 and March 15, 1973. Freshman classes begin September 4, 1973.

Roster of Regional Representatives of Admissions Committee

Alabama: *Birmingham*, Ben V. Branscomb

Alaska: *Anchorage*, Milo H. Fritz

Arizona: *Phoenix*, Stanley Karansky

Arkansas: *Little Rock*, Rosalind Smith Abernathy

California: *Berkeley*, H. I. Harvey; *Davis*, Robert S. Stempf, Jr.; *Los Angeles*, George Hayter, John L. Opdyke, Jr., Douglas F. Smiley; *Menlo Park*, Gustave Freeman; *Palo Alto*, Leon Cohen, James B. Golden; *San Francisco*, John E. Cann, R. Gray Patton; *San Mateo*, Lester H. Margolis; *West Covina*, Jeremiah W. Kerner; *West Los Angeles*, James L. Scott

Canada: *Montreal*, J. E. Gibbons; *Ottawa*, John B. Armstrong

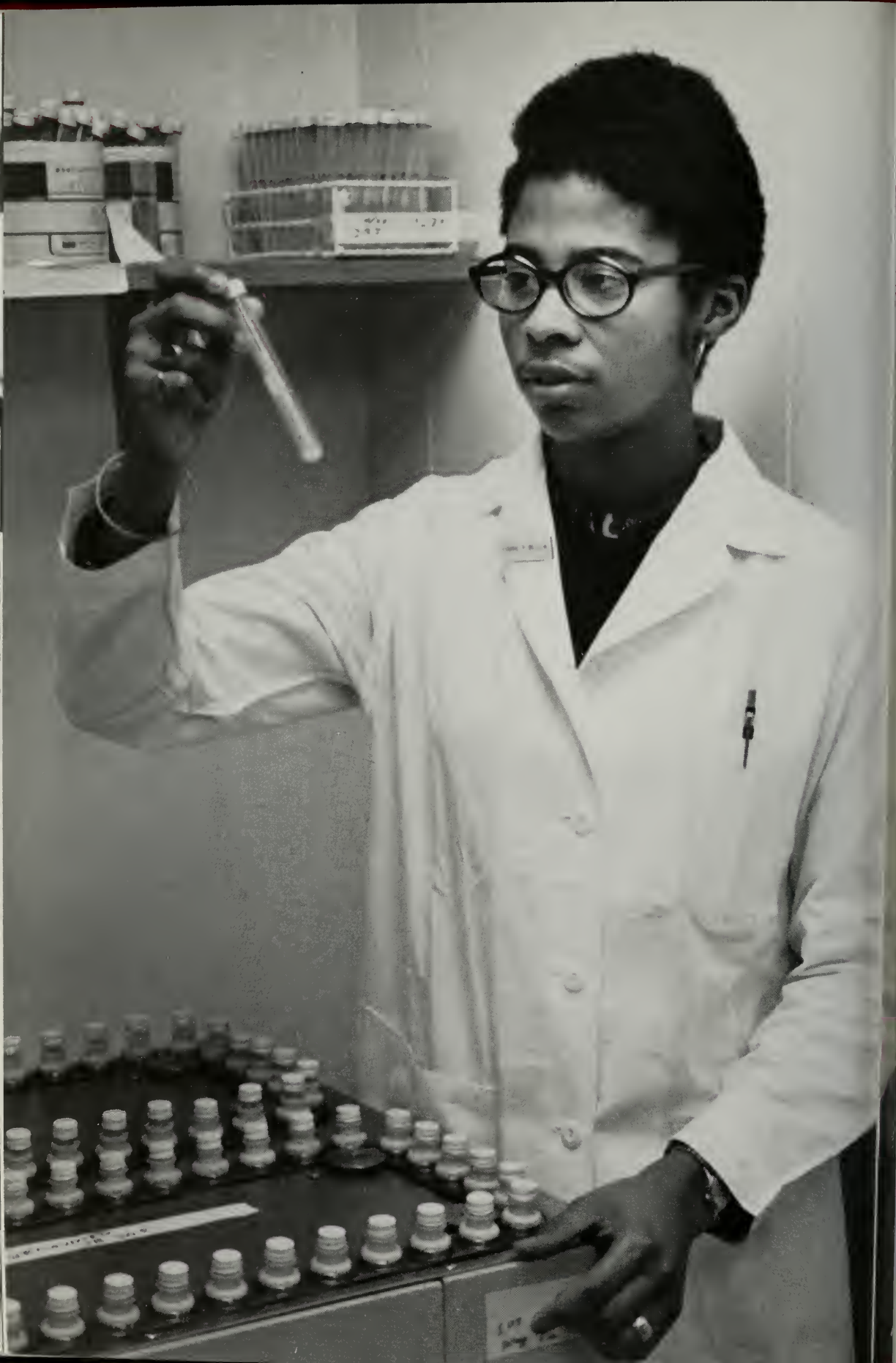
Colorado: *Denver*, John Ray Pryor, Fred W. Schoonmaker

Connecticut: *Hartford*, William H. Glass; *New Haven*, Clarence D. Davis, Saul A. Frankel, Joseph Mignone, Ned M. Shutkin

District of Columbia: Louis Spekter

Florida: *Deerfield Beach*, Eugene L. Horger; *Gainesville*, Joseph W. Shands, Jr.; *Jacksonville*, David W. Brooks, Jr.; *Lakeland*, Charles Larsen, Jr., John Verner, Jr.; *Miami*, James J. Hutson, David H. Reynolds; *South Miami*, Stanley J. Cannon; *St. Petersburg*, David S. Hubbell; *Tampa*, Richard G. Connar

Georgia: *Atlanta*, James C. Crutcher, E. B. Dunlap
Germany: *Berlin*, Otto H. Gauer
Hawaii: *Honolulu*, Richard K. Blaisdell, James G. Harrison, Jr.
Idaho: *Boise*, William L. Venning; *Idaho Falls*, Reid H. Anderson
Illinois: *Chicago*, Ruth K. Freinkel, George H. Gardner, Daniel J. Pachman, Earl N. Solon; *Evanston*, Donald R. Mundie, Milton Weinberg, Jr.; *Geneva*, Charles A. Hanson, *Monmouth*, Kenneth E. Ambrose
Indiana: *Angola*, Norman W. Rausch; *Columbia City*, John L. Vogel; *Indianapolis*, Norman H. Bell, John D. Graham
Iowa: *Davenport*, Alexander W. Boone; *Des Moines*, Charles W. Latchem; *Sioux City*, Havner H. Parish, Jr.
Kansas: *Salina*, Roy B. Coffey; *Wichita*, Thor J. Jager
Kentucky: *Lexington*, Kearns R. Thompson; *Louisville*, Billy Franklin Andrews, George Uhde
Louisiana: *New Orleans*, Richard H. Corales, Jr., Norbert Enzer, Harold M. Horack, Richard M. Paddison
Maine: *Portland*, E. Charles Kunkle
Maryland: *Baltimore*, John T. King, C. Edward Leach; *Towson*, William C. Battle
Massachusetts: *Boston*, Raymond D. Adams, James H. Currens, Ellison C. Pierce, Jr., Michael Steer, James L. Tullis, David Michael Young, James H. Austin, Dorothy A. Elias; *Springfield*, George A. Sotirion
Michigan: *Ann Arbor*, George E. Bacon, Donald L. Rucknagel; *Detroit*, Robert F. Kandel; *Port Huron*, William T. Davison
Minnesota: *Minneapolis*, Lewis W. Wannamaker; *Rochester*, Richard E. Symmonds
Missouri: *Columbia*, John T. Logue; *St. Louis*, Thomas B. Ferguson, Roman L. Patrick
Nebraska: *Beatrice*, R. Brown
New Hampshire: *Hanover*, George Margolis, R. J. Vanderlinde
New Jersey: *Montclair*, Benjamin B. Burrill; *New Brunswick*, William E. McGough, Bernard A. Rineberg
New Mexico: *Albuquerque*, Robert Proper; *Artesia*, C. Pardue Bunch
New York: *Albany*, Stuart Bondurant, Frank M. Woolsey, Jr.; *Buffalo*, Oliver J. Bateman; *Endicott*, James K. Tompkins; *Hornell*, Gordon Stenhouse; *Ithaca*, John G. Maines; *Lockport*, Frank H. Crosby; *New York*, Jules Hirsch, Julia M. Jones, Seymour R. Kaplan, Michael J. Lepore, Richard A. Ruskin, Leonard H. Schuyler, Robert A. Shimm; *Pittsford*, Rufus S. Bynum; *Rochester*, William L. Sutton; *Syracuse*, Alfred S. Berne, Herbert Lourie, James E. Sheehy
Ohio: *Cincinnati*, Murray B. Sheldon, Jr.; *Cleveland Heights*, Robert B. Kubek; *Columbus*, Robert J. Atwell, Charles A. Doan, Lucy R. Freedy, George W. Paulson, James V. Warren; *Dayton*, Stuart R. Ducker; *Elyria*, William L. Hassler; *Toledo*, William A. Phillips
Oklahoma: *Muskogee*, Robert H. Gibbs
Oregon: *Portland*, Joseph F. Paquet
Pennsylvania: *Bethlehem*, Ralph K. Shields, James G. Whildin; *Bryn Mawr*, John V. Blady; *Doylestown*, Zachary A. Simpson; *Harrisburg*, Earl S. Moyer, Alfred J. Sherman; *Johnstown*, W. Frederick Mayer; *Philadelphia*, Max W. Fischbach, Doris A. Howell, Alfred M. Sellers; *Pittsburgh*, H. V. Murdaugh, Jr., Jack D. Myers; *Scranton*, Louis C. Waller; *University Park*, Elaine Eyster; *Williamsport*, William R. Brink
Puerto Rico: *Santurce*, Kenneth B. Brown, Rafael Hernandez-Saldana
Rhode Island: *Providence*, Richard P. Sexton
South Carolina: *Charleston*, Edward F. Parker; *Columbia*, Ben N. Miller, James M. Timmons; *Greenville*, Raymond C. Ramage
Tennessee: *Chattanooga*, Richard Van Fletcher; *Knoxville*, Alan Solomon; *Memphis*, William L. Byrne; *Nashville*, Walter G. Gobbel, Jr., Alexander C. McLeod, Greer Ricketson; *Sewanee*, Henry T. Kirby-Smith
Texas: *Austin*, Francis A. Morris, Jr.; *Dallas*, Reuben H. Adams, W. Crockett Cheers, Jr., A. James Gill, William Shapiro; *Fort Worth*, Henry L. Burks; *Galveston*, R. H. Rigdon; *Houston*, Elizabeth Balas Powell, H. Grant Taylor; *Midland*, Dorothy B. Wyvell; *San Antonio*, Robert H. Barnes, Royall M. Calder; *Temple*, E. Clinton Texter, Jr.
Utah: *Salt Lake City*, Andrew Deiss, C. Hilmon Castle
Vermont: *Burlington*, Edward S. Horton
Virginia: *Richmond*, R. Lewis Wright; *Waynesboro*, Thomas L. Gorsuch
Washington: *Seattle*, A. Lawrence Banks, William A. MacColl, Lois Hale Watts
West Virginia: *Charleston*, Harold H. Kuhn
Wisconsin: *La Crosse*, C. Norman Shealy; *Milwaukee*, Jack L. Teasley



Financial Information

Tuition. The following table represents an estimate of a student's necessary expenses for the normal academic year of the School of Medicine. The total of these figures suggests a basic minimum budget of approximately \$4,570. Allowances for recreation, travel, clothing, and other miscellaneous items must be added to this estimate. These, of course, will vary considerably, depending upon the needs and tastes of the individual.

Tuition	\$ 2,500
Instruments and Insurance* (First year only)	716
Uniforms	58
Annual cost of books: first year	200
second year	150
third and fourth years	200
Lodging (University Housing)	325-570
Board (University Housing)	700
Student Health Service†	25
Student Government (Davison Society)	15
Motor Vehicle Registration—cars,	30
bicycles, motorcycles	10

†Mandatory Fee. For details, please refer to Student Health Service.

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November 3, 1972, January 12, 1973, and March 16, 1973. An additional billing payable by Friday, June 29, 1973, will be made to those who elect to attend the summer term.

The Office of the Bursar will send bills as a reminder of the exact amount payable to the University. A late fee of \$10.00 will be assessed for any portion of the tuition and other charges that remain unpaid and for which prior arrangements have not been made with the Bursar's Office. If a student who has paid fees should drop out of school, no refund will be made. No credit will be given for any term in which the tuition has not been paid, whether the work has been at Duke or elsewhere. A student is not eligible to attend classes or to make use of University facilities if he is in default of payment of funds owed the University. Nonreceipt of a bill does not exonerate the student from payment or from assessment of late fees. It is not advisable for students to attempt outside work to defray their expenses during the academic year. Wives of medical students desiring employment may secure information from the Medical Center Personnel Office or the Duke University Personnel Office.

Debts. No records are released and no student is considered by the faculty as a candidate for graduation until he has settled with the Bursar for all indebtedness.

Living Accommodations

Housing. Rooms in residence halls are normally rented for the academic year, but for no period less than one semester or specified term. The limited number of single rooms are usually reserved for returning students.

Each student assigned to the Town House Apartments is currently charged \$570.00 for the academic year on the basis of three individuals to an apartment. Utility charges are included in these rates. Rental rates for space in double residence hall rooms range from \$325 to \$355 for the academic year.

Residence Hall and Town House Apartment Regulations. Rooms and apartments are rented for the academic year. Room and apartment rentals for less than one term require special arrangements.

A resident student in order to retain his room or apartment for the succeeding academic year must make application at the Department of Housing Management for confirmation of his reservation.

No refund on room or apartment rent for a specified medical term will be made after the day of registration for that term except for students who involuntarily withdraw to enter the armed services of the United States. Such refunds will be made in accordance with the University's established schedule. Students desiring to cancel a residence hall reservation must provide written notice to the Department of Housing Management by July 15 for cancellation of a reservation for the fall semester and not later than ten days prior to the beginning of any subsequent medical term for a cancellation of a reservation for the next medical term. Such notice is essential to obtain refund of both room rent and the \$50 residential deposit.

The authorities of the University do not assume responsibility for persons selected as roommates, and each student is urged to select his roommate when reserving a room or apartment. Any student who occupies a double room without a roommate will be given written notice from the Department of Housing Management to obtain a roommate or he may be required to pay the rental consideration



for the whole room or apartment. Similar notification will be sent to occupants of apartments where vacancies occur.

Regulations governing the occupancy of rooms or apartments will be supplied by the Department of Housing Management to those students who make applications for housing. Occupants are expected to abide by these regulations.

Any exchange of rooms or apartments must be made at the Department of Housing Management. Persons who exchange rooms or apartments without the approval of the Department of Housing Management will be subject to the charge for both apartment spaces.

Residential Deposit and Refund. A \$50 deposit is required of each applicant before a housing reservation is made. This initial deposit serves as a continuing deposit for successive terms.

The residential deposit will be refunded under the following conditions:

1. Within thirty days after the student has been graduated.
2. Upon withdrawal from the University residence halls by students enrolled on the semester basis, provided written notice is received by the Department of Housing Management by July 15 for cancellation of a reservation for the fall semester, and not later than December 31 for the spring semester.
3. Upon withdrawal from the University residence halls by students enrolled on the basis of the medical term provided written notice is received by the Department of Housing Management by July 15 for cancellation of a reservation for the term beginning in September, and not later than ten days prior to the beginning of any subsequent medical term within the academic year.

The deposit required for apartments operated by Duke University is refunded under similar circumstances.

No refund will be made until the occupant has checked out of his room or apartment through the Department of Housing Management and has settled his account with the Bursar.

Dining Facilities. If a student dines on the Duke University campuses, the cost of food for the academic year will average approximately \$700.00. The prices of food are the same in each of the University-operated dining facilities.

Motor Vehicle Registration

Each motor vehicle operated on Duke University campuses by students enrolled in the School of Medicine must be registered at the Traffic Office, 2010 Campus Drive, within five days after operation on the campus begins, and thereafter must display the proper registration decal.

Resident students must pay an annual fee of \$30.00 for each four wheeled vehicle or \$10.00 for each motorbike or motor scooter registered. There is no charge for registering vehicles of students residing off campus.

To register a vehicle, the student must present the following documents: (1) valid state registration for vehicle registered, (2) valid state operator's license, and (3) satisfactory evidence of liability insurance as required by the state of North Carolina—\$10,000 per person, \$20,000 per accident for personal injuries, and \$5,000 property damage.

Parking, traffic and safety regulations will be given each student at the time of registration of his vehicle(s). Students are expected to abide by these regulations.

Financial Aid

The Duke University School of Medicine makes financial assistance available to accepted students who, due to financial circumstances, could not otherwise attend the University. Scholarships are assigned in accordance with policies governing the particular scholarship. Most scholarships are awarded on the basis of merit and financial need. Other funds, including loans, are available solely on the basis of financial need.

Financial Assistance to Incoming Freshmen. Those students who are accepted and who have indicated in their original application a need for financial aid will be sent a financial aid application with the letter of acceptance by the School of Medicine.

Financial Assistance to Upperclassmen. Upperclassmen seeking financial assistance for the first time should consult the Coordinator of Financial Aid to obtain an application.

Fellowships and Scholarships. The following fellowships and scholarships are available to students.

The Avalon Foundation Scholarships are non-refundable, granted on the basis of financial need and scholastic attainment.

The Mary Duke Biddle Foundation Scholarships, which may pay full tuition, are awarded to academically distinguished medical students who need financial assistance.

The Thomas C. Bost Foundation Scholarships may pay full tuition, and are awarded on the basis of need.

A Slane Family Scholarship is contributed annually to assist a needy medical student. A preference is for, but not limited to, a North Carolinian.

The Medical Faculty Wives Scholarship provides full tuition for four years to a worthy medical student who is a resident of North Carolina.

For a discussion of the Medical Scientist Traineeships, see Section on Combined M.D.-Ph.D. Training Programs.

The Pfizer Scholarship, offered by the Pfizer Laboratories, a division of Charles Pfizer & Co., Inc., is an award of \$1,000 granted to a student selected on the basis of merit and need.

The Sigmund Sternberger Scholarships are awarded in the amount of \$1,000 each to five medical students every year. Entering freshmen recipients receive the award for four years. Upperclassmen receive one year awards. Preference is given to North Carolina residents who intend to remain in the state to practice medicine.

The Charles Alva Strickland Memorial Fund Scholarships cover full tuition costs and are renewed each year on the basis of merit and need. The selection of the recipient is made by a committee of the Trust Department of Wachovia Bank and Trust Co.

The Francis and Elizabeth Swett Scholarships are awarded for a period of one year to entering students on the basis of merit and financial need and are renewable if funds permit, need exists, and academic excellence is maintained.

U. S. Public Health Service Health Professions Scholarships with a maximum of \$3,500 are available to United States citizens who cannot pursue the required studies without this aid. Demonstrated financial need is required.

The Dr. Hillory M. Wilder Scholarship Fund covers full tuition for students for the entire four years of undergraduate medical education and is awarded on the basis of merit and need.

The State of North Carolina has set up a tuition remission fund and it is available to residents of North Carolina (on the basis of need) who are in good academic standing up to \$1,500 per year.

The Dr. John Haden Lane Memorial Scholarship in the amount of tuition is renewable for four years providing the student remains in good academic standing and demonstrates financial need.

The Duke University Alumni Scholarship provides \$1,000 automatically renewable for four years to a student demonstrating financial need.

The Duke Hospital Medical Auxiliary Scholarship provides full tuition and fees for four years contingent upon academic good standing and financial need.

The Sue Eggleston Woodward Scholarship Fund assists students who demonstrate need on a limited basis.

Student Research Fellowships are available as part of a program designed to encourage the medical student to participate in research. Summer fellowships carry a stipend of \$200.00 per month. These fellowships enable selected students, following completion of their first year, to participate in research during a summer vacation or other free time. Special fellowships in nutrition, ophthalmology, allergy, and other fields are available. Opportunities also exist for students to engage in research for an entire year during which time he is temporarily on leave of absence from the School of Medicine.

Loans. University loans are available under the specific restrictions of the loan funds and are awarded on the basis of financial need.

U. S. Public Health Service Health Professions loans are available to United States citizens on the basis of demonstrated financial need.

Additional information may be obtained by writing Mrs. Nell Andrews, Coordinator of Financial Aid, Duke University Medical Center, Durham, North Carolina 27710.



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Courses of Instruction*

Anatomy

Professor: J. David Robertson, M.D. (Harvard, 1945), Ph.D. (Massachusetts Instit. of Tech., 1952), *Chairman*.

Professors: John Buettner-Janusch, Ph.D. (Michigan, 1957), John W. Everett, Ph.D. (Yale, 1932), Montrose J. Moses, Ph.D. (Columbia, 1949), Talmage L. Peele, M.D. (Duke, 1934).

Associate Professors: Kenneth L. Duke, Ph.D. (Duke, 1940), William Longley, Ph.D. (London, 1963), Michael K. Reedy, M.D. (Washington, 1962).

Assistant Professors: Mark Adelman, Ph.D. (Chicago, 1969), Frank H. Bassett, III, M.D. (Louisville, 1957), Jan Bergeron, V.M.D. (Pennsylvania, 1966), Matthew Cartmill, Ph.D. (Chicago, 1970), Sheila J. Counce, Ph.D. (Edinburgh, 1954), Harold P. Erickson, Ph.D. (Johns Hopkins, 1968), William C. Hall, Ph.D. (Duke, 1967), Miriam J. Jacobs, Ph.D. (Alabama, 1966), Kurt E. Johnson, Ph.D. (Yale, 1970), Kaye H. Kilburn, M.D. (Utah, 1954), M. Stephen Mahaley, Jr., M.D., Ph.D. (Duke, 1959), Jacqueline A. Reynolds, Ph.D. (Washington, 1963), James L. Shafland, Ph.D. (Chicago, 1968).

Associates: Arthur C. Chandler, Jr., M.D. (Duke, 1959), John A. Goree, M.D. (Duke, 1955), William Hylander, D.D.S. (Illinois, 1963), M.A. (Chicago, 1969), Jane S. Richardson, M.A. (Harvard, 1966), Lee Tyrey, Ph.D. (Illinois, 1969).

Research Associates: Vina M. Buettner-Janusch, B.S., Isabelle R. Faeder, Ph.D., Stuart Knutton, Ph.D., Anthony Limbrick, Ph.D., Juan Vergara, M.D.

Required Course

ANA-200, required of all first year students during the first eighteen weeks of Term 1, consists of approximately 100 hours in gross anatomy, 100 hours in microscopic anatomy, and 56 hours in neuroanatomy. The first eight weeks are devoted to gross anatomy of the human body, thirteen weeks to histology, and three weeks to neuroanatomy. All of the instruction is designed to be informal and individualized. The general principles and functional viewpoint of living anatomy are emphasized and, whenever possible, fresh tissues and living cells are used.

*An asterisk placed before the course number indicates that the course is also offered in the Graduate School.

In the gross anatomy laboratory students dissect the entire human body except the brain. Formal classroom lectures relate structures of the human body to their developmental and phylogenetic antecedents and the clinical significance of anatomical facts. Informal lectures are presented to small groups. Filmed lectures and prosections are available to students for laboratory and library study.

In microscopic anatomy students are introduced to light and electron microscopy, X-ray diffraction, and polarization optics as applied to structural organization in various tissues and organs. Biochemical, biophysical, and genetic cytology as well as muscle and membrane structure will be presented in detail.

Neuroanatomy and neurophysiology are taught concurrently to correlate these fields. Patients will be presented by faculty members in clinical neurology and neurosurgery. The major portion of the course is organized by systems, e.g., sensory, visual, auditory, olfactory, and motor including cerebellar, autonomic, hypothalamic, and limbic mechanisms. The microscopic structures of nerve cells, fibers, glia cells, and effector-receptor activities of spinal and cranial nerves will be studied. Two lectures in neuroradiology and two in electron microscopic studies of nerve tissue are included in the course.

Electives

ANA-206(B). Anatomy of Back and Extremities. Complete dissection of back and extremities, including pectoral and pelvic girdles. Visual aids will be used extensively. Course planned for orthopaedics, general practice, or neurosurgery. Terms: 3 or summer. Weight: 3. *Bassett*

***ANA-208(B). Anatomy of the Trunk.** Emphasis will be on the anatomy of the thoracic, abdominal, and pelvic organs, and their blood supply, innervations, and relationships. The dissections will be augmented by use of prosections, motion pictures, and prerecorded TV presentations. Course is planned for general practitioners and specialists in surgery and internal medicine. Terms: 3 or summer. Weight: 2. *Duke*

ANA-216(B). Anatomy of the Head. A study in detail of the general organization of head and neck. Emphasis on individual dissection and clinical implications. Terms: 4 or summer. Weight: 2. *Shafland and Hylander*

***ANA-231(B). Human Evolution I.** Evolutionary biology of the primates. Anatomical, behavioral, and molecular adaptations of fossil and living primate populations including *Homo sapiens*. Terms: 1 and 2. Weight: 3. *Buettner-Janusch and Cartmill*

***ANA-232(B). Human Evolution II.** Human population and biochemical genetics. Analysis of the effects of natural selection on past and present human populations. Terms: 3 and 4. Weight: 3. *Buettner-Janusch*

***ANA-236(B). Human Genetics.** Particular emphasis upon the uniqueness of studies in human genetics, clinical studies, human biochemical genetics, and human population genetics. Terms: 3 and 4. Weight: 3. *Buettner-Janusch*

ANA-256(B). Surgical Neuroanatomy. This course will utilize gross brain and spinal cord specimens, the skull, angiograms, x-rays, pneumoencephalograms,

and myelograms to correlated neurosurgical diseases and procedures with regional nuclei and tracts of the nervous system. Terms: 1, 2, 3, or 4. Weight: 1. *Mahaley*

ANA-260(B). Developmental Systemic Anatomy. A survey of all major systems or concentration on selected ones will be presented, depending on interests of students. Dated rat embryos, supplemented by primate material, will be used to follow the development of organ systems. Term: 4. Weight: 3. *Duke*

***ANA-271(B). Comparative Neurology and Psychology.** The general problem of reconstructing the evolution of the brain and behavior on the basis of information derived from living species will be considered. "Nerve net" organizations will be contrasted with the organization of ganglionated nervous systems. Brains of different species, particularly vertebrates, will be correlated with variations in the behavioral requirements of different habitats and with differences in genetic line of descent. (Also listed as Psychology 271.5 in the *Graduate School Bulletin*). Terms: 3 and 4. Weight: 3. *Hall*

***ANA-280(B). Molecular Basis of Anatomy.** Lectures and conferences on the molecular structure of biological macromolecules and their organized aggregates such as are found in viruses, muscle, membranes, and other intracellular organelles, with emphasis on the results of electron microscopy, X-ray diffraction, and optical analysis. Terms: 3 and 4. Weight: 3. *Longley, Adelman, Erickson, Moses, Reedy, and Robertson*

***ANA-284(B). Tutorial in Developmental Biology.** Reading and discussion arranged to individual's interests in the field. May be taken in addition to *ANA-411. Term: summer. Weight: 1 to 4. *Counce*

***ANA-290(B). Membrane Structure.** Theories of membrane structure and history of their development; physical and chemical structure of membranes; lipid, protein, and lipo-protein models. Electron microscopic, X-ray diffraction, and polarization optical studies of membrane structure considered in detail. Term: 4. Weight: 1. *Robertson*

***ANA-291(B). Special Topic in Nerve Ultrastructure.** Each student will choose a special topic (e.g., ultrastructure of synapses or morphological correlates of learning). Each student will pursue his topic in the library during the first half of the semester, with guidance from the instructor, and prepare a detailed paper. The second half of the semester will be devoted to seminar presentations and discussions of the selected topics. Terms: 1 and 2. Weight: 2. *Robertson*

***ANA-340(B). Tutorial in Advanced Anatomy.** Selected topics will be chosen for intensive reading and discussion. Topics may be chosen related to basic problems of cytology, growth and development, biophysics, endocrinological control, neuroanatomy, physiological differentiation, and evolutionary origins of functional micro-systems. Terms: 3 or 4; 3 and 4. Weight: 1½ per 9 weeks; 3 per 18 weeks. *Anatomy Faculty*

***ANA-344(B). Advanced Neuroanatomy of Sensory and Motor Mechanisms.** The course will involve consideration of classic and modern concepts of somatic and special sensory systems and of somatic and visceral motor systems.

Clinical correlations of basic neuroanatomy will be included. Term: 4. Weight: 3.
Peele

***ANA-354(B). Research Techniques in Anatomy.** A preceptorial course in various research methods in anatomy. An interested student might engage in research in physical anthropology, electron microscopy, developmental biology, fetal physiology, or stereotactic approaches to neuroendocrinology and neuroanatomy. Approval of the student by the faculty is required. Term: Summer. Weight: 8.
Anatomy Faculty

ANA-390(B). Anatomy of the Fetus. The chief objective will be to complete a dissection of the human fetus. Emphasis will be placed on comparing fetal and adult anatomical systems and relationships. Term: 4. Weight: 2. *Duke*

***ANA-403(B). Endocrinology and Reproduction.** Current concepts of biosynthesis, secretion, and mechanisms of action of hormones. Structural relationships and endocrine regulation at cellular, organ, and higher integrative levels. Structure and function of male and female reproduction systems including hormonal mechanisms in pregnancy and parturition. Also listed as ***PHS-403(B)**. Terms: 3 and 4. Weight: 3. *Anderson, Everett, and Fellows*

***ANA-411(B). Molecular and Cellular Bases of Development and Differentiation.** The advantages offered by recent advances in cellular molecular biology will be used to gain insight into the processes of development and differentiation. The interdisciplinary nature including studies at all levels should provide a firm foundation to understand the true nature of man and disease. Topics of the course include: Initiation of Development, Morphogenesis, Developmental Genetics, Stable and Labile Differentiation, Altered Cell Properties, and Nucleocytoplasmic Interactions. A seminar is offered as an extension of the subject matter. Terms: 1 and 2. Weight: 3 to 4. *Counce, McCarty, Moses, Adelman, Kaufman, Luftig, Sommer, Harris, Johnson, and Padilla*

ANA-414(B). The Human Embryo. The first eight weeks of development will be considered in detail, including fertilization, implantation, formation and function of embryonic membranes and placenta, and establishment of organ systems. Emphasis will be placed on distinctive features of human embryogenesis, and on causes, prompt identification, and treatment of congenital defects. Discussions of newborn evaluation and parent counseling will be included. Term: summer. Weight: 2. *Counce and Pounds*

Anesthesiology

Professor: Merel H. Harmel, M.D. (Johns Hopkins, 1943), *Chairman*.

Professors: Sara J. Dent, M.D. (Med. Coll. of South Carolina, 1945), Kenneth D. Hall, M.D. (Duke, 1953), David A. Davis, M.D. (Vanderbilt, 1941).

Associate Professor: Vartan Vartanian, M.D. (Cluj Univ. Medical School, Rumania, 1951).

Associate Clinical Professor: M. Bourgeois-Gavardin, M.D. (Univ. of Paris, France, 1945), (Duke, 1955).

Assistant Professors: Robert E. Benway, M.D. (Miami, 1957), Patrick J. Breen, L.R.C.P., S.I. (Royal College of Surgeons, Ireland, 1959), G. Douglas Blenkarn, M.D. (Univ. of Toronto, 1958), Jafar Sheikholislam, M.D. (Univ. of Teheran, Iran, 1958), Ingeborg H.

Talton, M.D. (Giessen Medical School, Germany, 1952), Luther Hollandsworth, M.D. (Bowman Gray, 1951).

Assistant Clinical Professor: David C. Daw, M.D. (Univ. of Western Australia, 1962).

Electives

ANE-250(C). Clinical Acute Respiratory Physiology. Work in Anesthesiology Blood Gas Laboratory learning theory and practice of oxygen electrode, carbon dioxide electrode and pH meter, and ancillary techniques, and in Recovery Room, Respiratory Care Unit, and study of ventilator problems. Every term. Weight: 2. *Hall, Blenkarn, Anderson, and Davis*

ANE-252(C). Clinical Anesthesiology II. Introduction to theory and practice of clinical surgical anesthesia, diagnostic and therapeutic nerve blocks, and cardiopulmonary resuscitation. Students will review physiology and pharmacology of anesthesia and perform general and regional anesthesia and will assist in post anesthetic respiratory care. Every term. Weight: 8. *Blenkarn, Dent, Hall, Vartanian, Breen, Talton, Sheikholislam, and Davis*

ANE-253(C). Anesthesiology Research. Course teaches techniques utilized in clinical and laboratory research in anesthesiology. In collaboration with the faculty, the student will work on a research project related to the physiology and pharmacology of anesthetic practice. A wide range of facilities is available for the measurement of respiratory and circulatory parameters, both in animals and in man. Every term. Weight: 8. *Davis, Blenkarn, and Daw*

Biochemistry

Professor: Robert L. Hill, Ph.D. (Kansas, 1954), *Chairman*.

Professors: Mary L. C. Bernheim, Ph.D. (Cambridge, England, 1928), Irwin Fridovich Ph.D. (Duke, 1955), Samson R. Gross, Ph.D. (Columbia, 1953), Walter R. Guild, Ph.D. (Yale, 1951), James B. Duke Professor Philip Handler,* Ph.D. (Illinois, 1939), Henry Kamin, Ph.D. (Duke, 1948), Norman Kirshner, Ph.D. (Pennsylvania State, 1952), Kenneth S. McCarty, Ph.D. (Columbia, 1957), James B. Duke Professor Charles Tanford, Ph.D. (Princeton, 1947).

Associate Professors: Stanley H. Appel, M.D. (Columbia, 1960), Ronald C. Greene, Ph.D. (California Inst. of Tech., 1954), Jerome S. Harris, M.D. (Harvard, 1933), Bernard Kaufman, Ph.D. (Indiana, 1961), William S. Lynn, Jr., M.D. (Columbia, 1946), K. V. Rajagopalan, Ph.D. (Univ. of Madras, 1957), Harvey J. Sage, Ph.D. (Yale, 1958), Robert E. Webster, Ph.D. (Duke, 1965).

Assistant Professors: Robert L. Habig, Ph.D. (Purdue, 1966), Dwight H. Hall, Ph.D. (Purdue, 1967), Philip D. Harriman, Ph.D. (California, 1964), William N. Kelley, M.D. (Emory, 1963), Sung-Hou Kim, Ph.D. (Pittsburgh, 1966), Nicholas M. Kredich, M.D. (Michigan, 1962), Patrick A. McKee, M.D. (Oklahoma, 1962), Jacqueline A. Reynolds, Ph.D. (Washington Univ., 1963), David C. Richardson, Ph.D. (Massachusetts Instit. of Tech., 1967), Lewis M. Siegel, Ph.D. (Johns Hopkins, 1965), J. Bolling Sullivan, Ph.D. (Texas, 1966), Robert W. Wheat, Ph.D. (Washington Univ., 1955).

Associates: John A. Bittikofer, Ph.D. (Purdue, 1971), Yasuhiko Nozaki, Ph.D. (Univ. of Tokyo, 1945).

Research Associates: Benjamin L. Allen, Jr., Judith Andersen, M.D., Anne Ball, Ph.D., James Bier, Ph.D., Herbert Evans, Ph.D., Edward Faeder, Ph.D., Lamar Fleming, M.D., Henry Forman, Ph.D., Robert Green, Ph.D., Margaret Haberland, Ph.D., Carole Hall, Ph.D., James S. V. Hunter, Ph.D., Masayuki Kanda, M.D., Annette Kirshner, Ph.D., Shio Makino, Ph.D., Joe McCord, Ph.D., Finbar A. McEvoy, Ph.D., Hara P. Misra, Ph.D., Winston Moo-Penn,

*On leave of absence.

Ph.D., Donald A. Morrison, Ph.D., Matthew J. Murphy, Ph.D., William Rich, Ph.D., Neal Robinson, Ph.D., Joel Shaper, Ph.D., Ross Smith, Ph.D., Howard Steinman, Ph.D., Stephen R. Turner, Ph.D., Ross W. Tye, Ph.D., Virginia Umaña, Ph.D., Frank Welsh, Ph.D., Byron Rubin, Ph.D.

Required Courses

BCH-200—the “core” course given to all freshmen medical students during a period of eighteen weeks in the first term—emphasizes the relationship between structure and function of the major classes of macromolecules in living systems including proteins, carbohydrates, lipids, and nucleic acids. The metabolic interrelationships and control mechanisms are discussed as well as the biochemical basis of human disease. An introduction to the biochemical basis of human disease is presented in a series of biochemical-clinical correlation lectures on such diseases as sickle-cell anemia, the glycogen storage diseases, gout, phenylketonuria, galactosemia, diabetes, and neoplasia.

BCH-204—the required course in genetics for all first year students—is given during fourteen weeks of the first term. The course emphasizes fundamental properties of gene function, recombination, selection, organization, and structure. Human and medical genetics are emphasized to provide basic concepts necessary for understanding the origin and consequences of genetic variability. Approximately one-third of the lectures illustrate basic genetic problems.

Students with previous formal training in genetic principles have the option of presenting a paper instead of taking the regular examinations. However, they are encouraged to attend clinical presentations inasmuch as new data are provided.

Electives

***BCH-216(B) Molecular Genetics.** An advanced course on genetic mechanisms and their relationship to nucleic acids. (Listed also in *Graduate School Bulletin* as Genetics 316). Terms: 3 and 4. Weight: 3. *Guild and Others of the University Program in Genetics*

***BCH-222(B). Protein Crystallography.** Introduction to the techniques of structure determination by single-crystal X-ray crystallography and study of some macromolecules whose three-dimensional structures have been determined at high resolution. Terms: 3 and 4. Weight: 2. *Richardson and Kim*

BCH-276(B). Comparative and Evolutionary Biochemistry. Lectures and discussion of the origin of life, evolution of the genetic code, mutation and protein polymorphism, natural selection and protein structure, and comparison of homologous proteins and nucleic acids. Laboratory work involves the purification and characterization of homologous proteins from fish and invertebrates. Techniques used include salt fractionation, electrophoresis, ion-exchange and molecular exclusion chromatography, fingerprinting, molecular weight determination, amino acid composition, and other related approaches. Term: Summer. Weight: 6 per 5 weeks. *Sullivan*

***BCH-290(B). Bioenergetics.** Biological mechanisms of transduction of energy (covalent, ionic, photonic, and electric) will be considered, using photosynthetic, oxidative, phosphorylative, and glycolytic systems as examples. Since



many of the above processes occur in membranous systems, the role and function of membranes in these processes will also be considered. Terms: 3 and 4. Weight: 2. *Lynn*

BCH-293(B). Macromolecules. The structure of biological macromolecules and their relations to biological functions. The emphasis is on proteins and enzymes. Terms: 1 and 2. Weight: 4. *Tanford and Hill*

***BCH-294(B). Nucleic Acids and Macromolecular Synthesis.** Physical properties of nucleic acids in terms of covalent structure, helix, base pairing, helix-coil transitions, as well as properties that influence fractionation by techniques of column-fractionation, and velocity and equilibrium centrifugation are considered in relation to biological function. Protein-nucleic acid interactions, as well as damage, repair, and mechanisms of synthesis will be reviewed. Mechanisms of RNA transcription and enzymatic alterations of preformed macromolecular structures will be illustrated by recent examples. Protein synthesis and polypeptide bond formation is considered in terms of initiation, decoding, translocation, ribosomes, termination, and release. Terms: 3 and 4. Weight: 3. *McCarty and Staff*

***BCH-282(B). Experimental Genetics.** A series of laboratory exercises and discussions on the molecular mechanisms of mutation, recombination, replication, transcription, and translation of the genetic material. Terms: 3 and 4. Weight: 2. *Harriman and Others of the University Program*

BCH-286(B). Current Topics in Immunochemistry. This course deals with the structure-function specificity of antibodies. Immunogenicity and tolerance are discussed, with special emphasis on current theories of the diversity and synthesis of antibody molecules. Terms: 3 and 4. Weight: 2. *Sage*

BCH-288(B). The Carbohydrates and Lipids of Biological Systems.

The subjects will be considered in two general categories. The first is the relationship between structure and function, particularly: (a) cell surface carbohydrates as antigenic determinants and their relationship to viral and carcinogen transformation, (b) connective tissue mucopoly-saccharides, and (c) structural features of lipids and phase transitions. The second category considered is biosynthesis and catabolism. Terms: 3 and 4. Weight: 2. *Kaufman*

***BCH-295(B). Enzyme Mechanisms.** A consideration of the theoretical and practical aspects of the isolation and assay of enzymes, kinetic description of enzyme catalysis, allostery, investigation of binding and catalytic sites, classification of enzymes, and mechanisms of enzyme action. Terms: 1 and 2. Weight: 3. *Fridovich and Rajagopalan*

***BCH-296(B). Biological Oxidations.** A lecture, conference, and seminar course which deals with the mechanism of electron transport and energy conservation in a variety of oxidative enzymes. These mechanisms will be examined both in purified enzymes and in organized systems such as the mitochondrion, the endoplasmic reticulum, and the chloroplast. Terms: 3 and 4. Weight: 2. *Kamin, Fridovich, Rajagopalan, and Siegel*

***BCH-297(B). Intermediary Metabolism.** The synthesis and degradation of carbohydrates, lipids, proteins, and nucleic acids will be discussed in detail with emphasis on energy transformation and metabolic interrelationships. Terms: 1 and 2. Weight: 3. *Kirshner and Siegel*

BCH-298(B). Regulation of Cellular Metabolism. Emphasis is placed on the metabolic hormonal and genetic regulation of the overall metabolism of the cell. Terms: 3 and 4. Weight: 2. *Greene and Staff*

***BCH-351(B). Genetics Seminar.** Required of all students specializing in genetics. Terms: 1 and 2. Weight: 1. *Gross and Others of the University Program in Genetics*

***BCH-352(B). Genetics Seminar.** Required of all students specializing in genetics. Terms: 3 and 4. Weight: 1. *Gross and Others of the University Program in Genetics*

BCH-355(B). Research in Genetics. In a limited number of cases, a student will be permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Terms: 1 and 2. Weight: 1. *Biochemistry Faculty*

BCH-356(B). Research in Genetics. In a limited number of cases, a student will be permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Terms: 3 and 4 or summer. Weight: 1. *Biochemistry Faculty*

BCH-357(B). Research in Biochemistry. In a limited number of cases, a student will be permitted to participate in the research program of a faculty mem-

ber. Acceptance is by individual arrangement with the proposed faculty preceptor. Terms: 1 and 2. Weight: 1. *Biochemistry Faculty*

BCH-358(B). Research in Biochemistry. In a limited number of cases, a student will be permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Terms: 3 and 4 or summer. Weight: 1. *Biochemistry Faculty*

BCH-360(B). Clinical Chemistry Laboratory. Medical students may participate in the program of Clinical Chemistry Laboratory on a tutorial basis. Students must receive the permission of the instructor. Terms: 1, 2, 3, or 4. Weight: 4. *Habig*

***BCH-411(B). Molecular and Cellular Bases of Development and Differentiation.** The advantages offered by recent advances in cellular molecular biology will be used to gain insight into the processes of development and differentiation. The interdisciplinary nature including studies at all levels should provide a firm foundation to understand the true nature of man and disease. Topics of the course include: Initiation of Development, Morphogenesis, Developmental Genetics, Stable and Labile Differentiation, Altered Cell Properties, and Nucleocytoplasmic Interactions. A seminar is offered as an extension of the subject matter. Terms: 1 and 2. Weight: 3 to 4. *Counce, McCarty, Moses, Adelman, Kaufman, Luftig, Sommer, Harris, Johnson, and Padilla*

Community Health Sciences

Professor: E. Harvey Estes, Jr., M.D. (Emory, 1947), *Chairman*

Professors: Jay M. Arena, M.D. (Duke, 1932), Leonard J. Goldwater, M.D. (New York Univ., 1928), E. Croft Long,* M.B., B.S. (Univ. of London, 1952), Ph.D. (Univ. of London, 1957), Max A. Woodbury, Ph.D. (Michigan, 1948).

Associate Professors: Gert H. Brieger, M.D. (California at Los Angeles, 1957), Ph.D. (Johns Hopkins, 1968), Arthur C. Christakos, M.D. (South Carolina, 1955), William E. Hammond, Ph.D. (Duke, 1967), Siegfried H. Heyden, M.D. (Univ. of Berlin, 1951), William O'Fallon, Ph.D. (North Carolina, 1965), Louis R. Pondy, Ph.D. (Carnegie Instit., 1966).

Assistant Professors: Daniel T. Gianturco, M.D. (Buffalo, 1960), D. Robert Howard, M.D. (Wisconsin, 1962), J. Matthews, M.P.H. (North Carolina, 1967), James A. McFarland, M.D. (Johns Hopkins, 1956), John B. Nowlin, M.D. (Duke, 1959), W. D. Poe, M.D. (Bowman Gray, 1943), Jesse E. Roberts, M.D. (Louisiana State, 1961), W. J. Kenneth Rockwell, M.D. (Duke, 1961), Eva J. Salber, M.D. (Univ. of Capetown, 1955).

Assistant Clinical Professors: J. F. Finklea, M.D. (Med. Coll. of South Carolina, 1958), D.P.H. (Michigan, 1966), Douglas I. Hammer, M.D. (Tufts, 1962), V. Hasselblad, Ph.D. (California, 1967), C. M. Shy, M.D. (Marquette, 1962).

Associates: M. A. Boeck, Ph.D. (Minnesota, 1970), Ron W. Davis, Ed.D. (Columbia, 1952), Michael Hamilton, M.D. (Rochester, 1964), Albert E. Hathaway, M.D. (Hahnemann Med. Coll., 1945), Thomas T. Jones, M.D. (Johns Hopkins, 1932), Patricia Lawrence, M.A. (Columbia, 1960), David E. Lewis, M.A. (Northern Michigan, 1968), Dorothy E. Naumann, M.D. (Syracuse, 1940), Lois A. Pounds, M.D. (Pittsburgh, 1965), R. A. Rosati, M.D. (Duke, 1967), Robert L. Thompson, Ed.D. (Duke, 1968), Thomas T. Thompson, M.D. (Med. Coll. of Virginia, 1964), Gerard Musante, Ph.D. (Tennessee, 1971), Catherine M. Severns, R.N.-P. (Yale, 1971).

Clinical Associates: J. Ted Best, M.D. (North Carolina, 1968), John R. Kindell, M.D. (Virginia, 1955), L. M. Alexander, M.D. (Duke, 1950), R. S. Cline, M.D. (North Carolina,

*On leave of absence.

1957), F. P. Dalton, M.D. (Duke, 1960), P. O. Howard, M.D. (Virginia, 1955), J. P. Stratton, M.D. (Harvard, 1961), R. M. Wilkins, M.D. (Bowman Gray, 1963).

Instructors: Debra W. Kredich, M.D. (Michigan, 1962), D. H. Tilley, M.A. (Duke, 1967).

Required Course

CHS-200—the course required during the second year—consists of weekly two-hour lecture-discussions presented by faculty and guests to introduce the student to problems of patients obtaining adequate medical care, characteristics of health care systems, and new techniques for improved care. In the second half of the course, students are instructed in biostatistics and epidemiology applicable to physicians.

Electives

CHS-208(B). Medical Uses of Computers. The elements of digital computer programming and techniques of data storage and retrieval. Emphasis will be on familiarizing the student with possible uses of digital computers in a variety of medical data handling problems. Terms: 2 or 4. Weight: 2. *Rosati*

CHS-215(B). Biostatistics in the Medical Sciences. The theory and application of basic statistical concepts as they affect the design and analysis of biomedical research activities. Terms: 3 or summer. Weight: 2. *O'Fallon*

CHS-225(B). Digital Computers and Their Application in the Health Sciences. For students desiring an intensive exposure to medical computer applications. This course provides a variety of options in computer medicine. A complete course begins in the summer and goes throughout the school year. It includes Mathematics 51 (Digital Computers), which will be taught in an intensive sequence in the second summer term preceding the rest of the course. A weekly seminar and apprenticeship to a clinician utilizing computers form a central focus for the course. Every term. Weight: 10. *Woodbury*

CHS-227(B). Medicine in America. The historical development of medical science, the medical profession, and patterns of medical care in the United States. Included will be such topics as sanitary reform, the physicians' standing in society, medical organizations, and poverty and medicine. Terms: 3 or 4. Weight: 1. *Brieger*

CHS-229(B). The Development of Modern Medicine. Comprising lectures, discussion, and readings, this course will outline the general history of medicine and will then emphasize the evolution and acceptance of some of the key ideas of modern medicine such as the cell theory, the germ theory, antisepsis, and theories of immunity. The focus will be on the nineteenth and early twentieth centuries. Terms: 1 or 2. Weight: 1. *Brieger*

CHS-231(B). Medical Care Insurance. A seminar to cover the history of health insurance in the United States and selected European countries; compulsory versus voluntary insurance; advantages and disadvantages of major specific programs; interests of the consumer, the provider, and the insuring agency; attitudes and role of "organized medicine"; trends in health insurance. Terms: 2, 3, 4, or summer. Weight: 1. *Goldwater*

CHS-233(B). Medicine and Industry. Seminar-type discussions covering historical background (developments prior to the industrial revolution); important early figures (Agricola, Paracelsus, Ramazzini); labor legislation and workmen's compensation interests and roles of employees, trade unions, insurance companies, government, universities; occupational health hazards and diseases and industrial hygiene; occupational health services; professional and community relationships; trends and prospects. Terms: 2, 3, 4, or summer. Weight: 1. *Goldwater*

CHS-235(B). Collection and Analysis of Survey Information. A body of survey data will be given directed analysis. Essential data collection, preparation, statistical and computer techniques will be learned. A questionnaire prepared for a sex education survey in connection with OBG-241(C) will provide a basic set of data for analysis. Questions for discussion include: assessment of effectiveness of course presentation; response differences as related to sex, age, race of respondent; item analysis of questionnaires. Terms: 2 or 4. Weight: 1 to 2. *Dorsey*

CHS-237(B). Analysis of Health Care Systems. A 9 to 18 week program under the auspices of the Department of Community Health Sciences to permit a student to study health care systems and analytic tools appropriate to solving problems of health care delivery. A weekly 2-hour seminar with the departmental staff will provide a central focus. Each student will carry out a project. The student will be encouraged to utilize in his project approaches developed in the disciplines of management sciences, economics, sociology, computer technology, biostatistics, and epidemiology. Every term. Weight: 8. *Estes and Staff*

CHS-217X(C). Community Health in Georgia. An experience in applied community health sciences in Georgia: epidemiology of cardio- and cerebrovascular disease in the Evans County Study (started in 1960 and now in its twelfth year). Development of research projects depending on the special interest of the student leading to papers for publication. Room, board, and mileage will be paid by the Evans County Health Department). Term: summer. Weight: 9. *Heyden and Hames*

CHS-219(C). Tutorial in Clinical Epidemiology. Selected topics will be chosen for intensive reading and discussion. Major emphasis is on cardio- and cerebrovascular chronic-degenerative and major neoplastic diseases, including patient demonstrations on the ward. Terms: 3 or 4. Weight: 2. *Heyden*

CHS-221(C). Computers in Patient Monitoring and Clinical Research. For students who have already learned the fundamentals of digital computing, an advanced tutorial concerning the use of large computers in the handling of analog and categorical clinical data originating from patients. Each student will be encouraged to pursue an independent research project. Every term. Weight: 2 to 4. *Rosati and Starmer*

CHS-239(C). Community Medical Care Experience. An experience will be arranged for each student under the supervision of competent clinical instructors in their own clinical environments. A portion of the term will be spent in discussion of the salient features which make the particular clinical environment similar to and distinct from other representative types of clinical experience. Possibilities might include clinical activities in a small hospital environment such as the

Sea Level Hospital, or an outpatient experience in a neighboring community. Every term. Weight: 9. *Estes*

CHS-241(C). Urban and Rural Health Care Delivery Models. A seminar to discuss an ongoing study of community health care in the Bragtown and Rouge-mont communities. Topics under discussion will include the bounds, structure, and characteristics of the populations under study; health care needs and desires; availability and needs for preventive services; health educational needs; problems of acute medical care delivery and chronic and home care; available community resources. (Term 2 will be a tutorial project on one of the above subject areas.) Terms: 1 and 2; 3 and 4. Weight: 1 to 3. *Estes*

CHS-243(C). Ambulatory Clinics. A two-hour seminar to discuss the following topics: group practice, prepayment versus fee for service plans, screening clinics, use of ancillary health manpower, automated medical records, accounting procedures, ambulatory health centers. Terms: 3 or 4. Weight: 1. *McFarland*

CHS-245(C). The Use of New Health Manpower. A seminar with discussion of analyses of physicians' tasks (concept of delegation), historical aspects (Feldsher, assistant medical officer), legal regulations, existing training programs, and unresolved problems. Recent experiences with physicians assistants will provide a central focus. Every term. Weight: 2. *Howard*

CHS-253(C). Rehabilitation Medicine. Utilization of rehabilitation techniques as applied to chronic patient care. Work with paramedical personnel in the overall therapy and discharge planning of severely disabled patients and become familiar with public and private resources. Course is flexible and can be tailored for specific need and requirement of student. Terms: 1, 2, 3, or 4. Weight: 1 to 6. *Roberts and Poe*



Medicine

Professor: James B. Wyngaarden, M.D. (Michigan, 1948), *Chairman*.

CARDIOLOGY DIVISION

Professor: Andrew G. Wallace, M.D. (Duke, 1959), *Chief*.

Professors: E. Harvey Estes, M.D. (Emory, 1947), Joseph C. Greenfield, M.D. (Emory, 1956), Walter Kempner, M.D. (Univ. of Heidelberg, Germany, 1926), Edward S. Orgain, M.D. (Virginia, 1930), Eugene A. Stead, Jr., M.D. (Emory, 1932).

Associate Professors: Robert J. Bache, M.D. (Harvard, 1964), John P. Boineau, M.D. (Duke, 1959), Walter L. Floyd, M.D. (Johns Hopkins, 1954), James J. Morris, M.D. (State Univ. of New York, 1959), Robert E. Whalen, M.D. (Cornell, 1956).

Assistant Professors: Victor S. Behar, M.D. (Duke, 1961), Yi-Hong Kong, M.D. (National Defense Medical Center, Taiwan, 1958), James A. McFarland, M.D. (Johns Hopkins, 1956), Patrick A. McKee, M.D. (Oklahoma, 1962), Robert H. Peter, M.D. (Duke, 1961), C. Frank Starmer, Ph.D. (North Carolina, 1968), Abe Walston, M.D. (Duke, 1963).

Associates: David L. Brewer, M.D. (Oklahoma, 1966), Frederick R. Cobb, M.D. (Mississippi, 1964), Eugene M. Kendall, M.D. (Duke, 1967), Barbara C. Newborg, M.D. (Johns Hopkins, 1949), Robert A. Rosati, M.D. (Duke, 1967), Michael Rotman, M.D. (Texas, 1966), Alfred J. Rufty, Jr., M.D. (Louisiana State Univ., 1961), Galen S. Wagner, M.D. (Duke, 1965).

DERMATOLOGY DIVISION

Professor: J. Lamar Callaway, M.D. (Duke, 1932), *Chief*.

Associate Professor: John P. Tindall, M.D. (Duke, 1959).

ENDOCRINOLOGY DIVISION

Professor: Harold E. Lebovitz, M.D. (Univ. of Pittsburgh, 1956), *Chief*.

Professors: J. P. Hendrix, M.D. (Pennsylvania, 1930), William S. Lynn, M.D. (Columbia, 1946), William M. Nicholson, M.D. (Johns Hopkins, 1931).

Associate Professor: Harry T. McPherson, M.D. (Duke, 1948).

Assistant Professors: George J. Ellis, M.D. (Harvard, 1963), Jerome M. Feldman, M.D. (Northwestern, 1961), Robert E. Fellows, Jr., M.D. (McGill, 1959), Ph.D. (Duke, 1969), Charles Johnson, M.D. (Howard, 1963), Francis A. Neelon, M.D. (Harvard, 1962).

Associate: Harry K. Delcher, M.D. (Florida, 1966).

ENVIRONMENTAL MEDICINE DIVISION

Professor: Kaye H. Kilburn, M.D. (Utah, 1954), *Chief*.

Associate Professor: Daniel B. Menzel, Ph.D. (California, 1962).

Associates: Tryggvi Asmundsson, M.D. (Iceland, 1964), John D. Hamilton, M.D. (Colorado, 1964).

GASTROENTEROLOGY DIVISION

Professor: Malcolm P. Tyor, M.D. (Duke, 1946), *Chief*.

Associate Professor: David L. Young, M.D. (Texas, 1956).

Assistant Professors: John T. Garbutt, M.D. (Temple, 1962), Jacqueline C. Hijmans, M.D. (Univ. of Leiden, 1951), Charles M. Mansbach, II, M.D. (New York Univ., 1963), Michael E. McLeod, M.D. (Duke, 1960), Steven H. Quarfordt, M.D. (New York Univ., 1960).

HEMATOLOGY DIVISION

Professor: R. Wayne Rundles, Ph.D. (Cornell, 1937), M.D. (Duke, 1940), *Chief*.

Professors: John Laszlo, M.D. (Harvard, 1955), Stuart M. Sessoms, M.D. (Med. Coll. of Virginia, 1946).

Associate Professors: Wendell F. Rosse, M.D. (Chicago, 1958), Harold R. Silberman, M.D. (Washington Univ., 1956).

Assistant Professors: Bruce W. Dixon, M.D. (Pittsburgh, 1965), Howard L. Elford, Ph.D.

(Cornell, 1962), Andrew T. Huang, M.D. (Taiwan, 1965), William B. Kremer, M.D. (State Univ. of New York, 1962), Donald S. Miller, M.D. (Harvard, 1962).

Associates: Harvey J. Cohen, M.D. (State Univ. of New York, 1965), Gerald L. Logue, M.D. (Pittsburgh, 1966).

INFECTIOUS DISEASE DIVISION

Associate Professors: Roger J. Bulger, M.D. (Harvard, 1966), Thomas R. Cate, M.D. (Vanderbilt, 1959), Suydam Osterhout, M.D. (Duke, 1949), Ph.D. (Rockefeller Instit., 1959).

NEPHROLOGY DIVISION

Professor: Roscoe R. Robinson, M.D. (Oklahoma, 1954), *Chief*.

Associate Professors: James R. Clapp, M.D. (North Carolina, 1957), J. Caulie Gunnells, M.D. (Med. Coll. of South Carolina, 1956).

Assistant Professors: Richard M. Portwood, M.D. (Texas, 1954), C. Craig Tisher, M.D. (Washington Univ., 1961), William E. Yarger, M.D. (Baylor, 1963).

NEUROLOGY DIVISION

Professor: Stanley H. Appel, M.D. (Columbia, 1960), *Chief*.

Professors: Albert Heyman, M.D. (Maryland, 1940), John B. Pfeiffer, Jr., M.D. (Cornell, 1942).

Associate Professors: Irwin A. Brody, M.D. (Pennsylvania, 1956), Marcel Kinsbourne, B.M., Ch.B. (Guy's Hospital, London, 1955), Ph.D. (Oxford Univ., 1963), Talmage L. Peele, M.D. (Duke, 1934), Saul M. Schanberg, M.D. (Yale, 1964), Ph.D. (Yale, 1961).

Assistant Professors: Antonio V. Escueta, M.D. (Univ. of Santo Tomas, Phillipine Islands, 1963), John F. Griffith, M.D. (Univ. of Saskatchewan, 1958), Ara Tourian, M.D. (Iowa, 1958).

Associates: J. Gordon Burch, M.D. (Univ. of Alberta, 1967), Allen D. Roses, M.D. (Pennsylvania, 1967), Ng Khye Weng, M.D. (Univ. of Malaysia, 1956).

PULMONARY-ALLERGY DIVISION

Professor: Herbert O. Sieker, M.D. (Washington Univ., 1948), *Chief*.

Professors: Kaye H. Kilburn, M.D. (Utah, 1954), Herbert A. Saltzman, M.D. (Jefferson, 1952).

Associate Professors: Charles E. Buckley, M.D. (Duke, 1954), Thomas R. Cate, M.D. (Vanderbilt, 1959), Johannes A. Kylstra, M.D. (Univ. of Leiden, 1952), Ph.D. (Univ. of Leiden, 1958).

Assistant Professors: Samuel M. McMahon, M.D. (Ohio State, 1962), Hiroshi Nagaya, M.D. (Univ. of Tokyo, 1956).

Associates: Tryggvi Asmundsson, M.D. (Univ. of Iceland, 1964), Gerald M. Halprin, M.D. (Wayne State, 1962).

RHEUMATIC AND GENETIC DISEASE DIVISION

Associate Professor: William N. Kelley, M.D. (Emory, 1963), *Chief*.

Professors: Grace P. Kerby, M.D. (Duke, 1946), James B. Wyngaarden, M.D. (Michigan, 1948).

Assistant Professors: Stephen I. Chavin, M.D. (Rochester, 1962), Nicholas Kredich, M.D. (Michigan, 1962), Jesse E. Roberts, M.D. (Louisiana State, 1961).

ADJUNCT FACULTY

Professors of Experimental Medicine: Gertrude B. Elion, D.Sc. (George Washington, 1969), George H. Hitchings, Ph.D. (Harvard, 1933), Robert A. Maxwell, Ph.D. (Princeton, 1954), Charles A. Nichol, Ph.D. (Wisconsin, 1949).

CLINICAL FACULTY

Clinical Professor: John R. Haserick, M.D. (Minnesota, 1941).

Clinical Assistant Professors: A. Derwin Cooper, M.D. (George Washington, 1932), Durham, N. C.; John C. Lumsden, B.S. (North Carolina State, 1947), Raleigh, N. C.; Thomas R. Harris, M.D. (Tennessee, 1955), Shelby, N. C.; Charles W. Styron, M.D. (Duke, 1938), Raleigh, N. C.

Clinical Associates: Sherwood W. Barefoot, M.D. (Duke, 1938), Greensboro, N. C.; Woodrow W. Batten, M.D. (Bowman Gray, 1944), Smithfield, N. C.; John R. Bumgarner, M.D. (Med. Coll. of Virginia, 1939), Raleigh, N. C.; George W. Crane, M.D. (Northwestern, 1946), Durham, N. C.; Walter C. Fitzgerald, M.D. (Virginia, 1943), Danville, Va.; Peter P. Gebel, M.D. (Harvard, 1958), Durham, N. C.; Robert S. Gilgor, M.D. (Pennsylvania, 1962), Chapel Hill, N. C.; Harvey E. Grode, M.D. (Duke, 1960), Durham, N. C.; John H. Hall, M.D. (Duke, 1964), Greensboro, N. C.; George E. Koury, M.D. (Tulane, 1944), Burlington, N. C.; Thomas D. Long, M.D. (Bowman Gray, 1952), Roxboro, N. C.; Emmett S. Lupton, M.D. (New York Univ., 1938), Greensboro, N. C.; John A. Lusk, M.D. (Alabama, 1951), Greensboro, N. C.; D. E. Miller, M.D. (Duke, 1956), Durham, N. C.; John A. Moore, M.D. (Med. Coll. of Virginia, 1948), Greensboro, N. C.; Henry T. Perkins, M.D. (Duke, 1957), Raleigh, N. C.; Jack G. Robbins, M.D. (Duke, 1948), Durham, N. C.; Richard J. Rosen, M.D. (George Washington Univ., 1955), Greensboro, N. C.; William V. Singletary, M.D. (Duke, 1943), Durham, N. C.; Allen D. Smith, M.D. (Georgia, 1937), Durham, N. C.; David G. Welton, M.D. (Wisconsin, 1935), Charlotte, N. C.

Required Courses

The Department of Medicine traditionally has the responsibility of preparing the student for a lifetime of learning as he gives care to patients who ask him for help. The first step is to begin to think and act like a doctor.

MED-201—Introduction to Clinical Medicine—a course in the first year prepares the student to take an active role in patient care. The course is designed to introduce students to the methods involved in obtaining information about patients and their problems by means of accurate and complete history taking and performance of physical and laboratory examinations. Early in the course, students are taught the methods used in patient interviewing, the essentials of examination of various organ systems, and the techniques and meaning of the hematological and other laboratory examinations by means of introductory lectures and experience with patients on the ward and in the laboratory. Information obtained in the other first year courses is correlated with clinical manifestations of health and disease. In the latter part of the course, the abnormalities found in the physical examination of certain organ systems are correlated with the abnormalities of laboratory values found. Patient conferences are used to demonstrate the value of obtaining all data about the patient to solve his problems. The student is expected to learn to do this in patients with whom he has contact during the ward sessions.

MED-205—the basic course in medicine for all students—is a seven-week clinical clerkship in the second year. The student's desire to give good care is the motive which drives him to excellence. The student learns to identify problems of the patient and marshal the information obtained by past training. He recognizes and attempts to focus the data learned from the basic sciences to specific clinical problems. Using patients as a means of integration, students should continue reading in anatomy, physiology, microbiology, pharmacology, and biochemistry. Problems encountered are discussed with fellow students, interns, residents, and senior staff to gain familiarity with ideas and concepts by actively manipulating them.

The goal of the Department of Medicine is for students to have as many learning experiences as possible by active participation. We hope that they will enjoy these learning experiences so much that they will continue them as long as they see patients. The goal is not to cover the entire field of medicine. Students will engage in extensive postdoctoral clinical or research training. The aims are to



assist students in acquiring clinical skills and learning habits that will enable them to identify and solve new problems as they are encountered.

In caring for patients with ill-defined genetic and acquired differences with numerous unknown variables, many erroneous conclusions may be made. Students must learn to examine carefully oral and written statements, and inquire of all authorities the source of data which underlie their conclusions. One way for students to learn the difficulties in drawing accurate conclusions about biological systems is to give them opportunities to establish facts on the basis of their own research. This is a very effective method of teaching. The intellectual discipline involved better prepares the future clinician for the role of a lifetime of learning and enables academically oriented students to assess their own potentialities for investigative careers.

The second year course in medicine is aimed at providing students with the basic tools used in the practice of medicine. This is the time when they should consolidate the material learned during the first year and apply it to the study of their own patients. During a brief seven-week course it is not possible to systematically cover the entire body of knowledge of internal medicine. Therefore, students are provided a series of representative learning experiences based on the case study method. The goals are to teach methods of approach to patients, and provide a firm foundation for the solution of new medical problems as they are encountered in the months and years ahead. Specific expectations of sophomore students are: (1) To obtain and carefully record meaningful histories and perform physical examinations on two or three patients each week. On the night of admission the student will review and compare his findings with the responsible intern or resident. Difference of opinions should be discussed and when possible, return to the bedside. The following day students will present their data to the attending physician. The presentation should be well organized (with the help of the resident), and the present illness should include a carefully reasoned documentation of the events in chronological order which led to the patient's hospitalization. It should

contain pertinent facts leading to the most likely diagnosis and also the pertinent negative facts which weigh against a possible alternative diagnosis. (2) To examine their patients repeatedly and reflect on the diagnostic and therapeutic management. It is their responsibility to understand the objectives and to know the results and the interpretation of all diagnostic tests applied to their patients. They will actually perform as many of the necessary tests as possible and record their interpretations in frequent progress notes. (3) To read widely on topics related to their patients, particularly in applicable basic sciences to understand disease mechanisms. They should begin with the descriptions in standard textbooks of medicine which serve as a useful introduction to the subject. Special aspects of the patient's problem should be pursued in basic science or other textbooks, in monographs, or in relevant journals. (4) To know in depth those diseases present in their own patients, including different diagnostic features which distinguish those conditions from related diseases. At this stage of training they are not expected to have equivalent depth of knowledge of diseases that they have not as yet encountered, but are responsible for knowing the major points about patients presented in rounds or at the various noon conferences. Principles of therapy should be understood and details of drug regimen are better left for subsequent experiences. Students are encouraged to participate actively in all teaching exercises on the ward, whether or not their own patients are being discussed.

Electives

MED-202(C). Introduction to Clinical Neurology. Overall view of clinical neurology for the non-specialist. Emphasis on clinical techniques in neurologic examination, approach to neurologic diagnosis and anatomic, pathologic, and physiologic basis for localization of neurologic lesions. EEG and neuro-roentgenogram interpretation. Common neurologic disturbances at bedside conferences. Every term. Weight: 2. *Appel, Heyman, and Neurology Staff*

MED-204(C). Correlative Neurosciences. A view of clinical neurology with emphasis on relation to basic neurosciences. Course especially for students planning careers in psychiatry, neurosurgery, internal medicine, orthopaedics, or neurology. Supervised examination of neurologic patients, discussion seminars, and a guided program of reading. Every term. Weight: 4. *Brody and Neurology Staff*

MED-206(C). Clinical Clerkship in Neurology. A clerkship in clinical neurology emphasizing diagnosis and therapy of neurologic diseases. The students will participate in inpatient and outpatient workups, teaching conferences, and diagnostic studies. Every term. Weight: 8. *Appel and Neurology Staff*

MED-207(C). Advanced General Medicine. The student is assigned to inpatient, or outpatient medical services, or emergency ward, and is responsible for patients assigned to him. He will learn about disease and its management through the staff and consultants directly concerned with the patients. Every term. Weight: 8. *Wyngaarden and Staff*

MED-208(C). Cognitive Neurology. The syndromes arising from focal cerebral damage studies at bedside and by experimental psychological methods. Emphasis on detailed analysis of disturbed cerebral function (aphasia, agnosia, etc.). Comparable methods used to study children with reading and writing difficulties.

Instruction will be given in experimental psychological techniques. Students offered the opportunity to participate in ongoing research projects. Terms: 1 and 3. Weight: 4 to 8. *Kinsbourne*

MED-209(C). Allergy and Respiratory Diseases. Course provides both introduction and indepth training in the clinical and laboratory aspects of allergic and respiratory illnesses. Patients are assigned to the student from both the inpatient and outpatient services. Seminars and conferences are held throughout the week for instruction in allergy, clinical immunology, basic immunology, pulmonary function evaluation, and pulmonary physiology. Every term. Weight: 8. *Seiker, Buckley, Cate, Cooper, Kilburn, Kylstra, McMahon, Nagaya, Pratt, and Saltzman*

MED-215(C). Clinical Dermatology. Students will be assigned to public and private outpatient clinics and will be assigned public and private patients in the hospital in an effort to understand the pathologic physiology of dermatologic disorders and thus management and treatment. Special arrangements needed for 4 or 5 credits. (See MED-216C for lecture course.) Every term (summer term by special arrangement only). Weight: 4, 5, or 8. *Callaway and Tindall*

MED-216(C). Clinical Dermatology. Students will be given a series of two lectures weekly using 35 mm. Kodachrome slides to illustrate both clinical conditions and microscopic sections of the pathologic changes in an effort to understand the pathologic physiology of dermatologic disorders and thus management and treatment. Patient demonstrations will be made half-day to greatly enhance clinical experience. Lecture and demonstration course only. (See MED 215C for course offering 4, 5, or 8 credits.) Term: 3. Weight: 2. *Tindall*

MED-217(C). Gastroenterology. The role of the gastrointestinal tract and liver in health and disease is emphasized through use of liver and small bowel biopsy with morphological, biochemical, and physiological studies in the daily diagnosis and care of patients hospitalized on the gastroenterology inpatient service and general wards of Duke and V. A. Hospitals. Every term. Weight: 4 or 8. *Tyor, Garbutt, Hijmans, Mansbach, McLeod, Quarfordt, and Young*

MED-221(C). Metabolism and Endocrinology. A general course in the clinical and laboratory diagnosis of metabolic and endocrinologic disorders. The student participates in the work-up and management of both inpatient and outpatient problems. Every term. Weight: 8. *Lebovitz, McPherson, Nicholson, Ellis, Feldman, Neelon, Johnson, and Delcher*

MED-227(C). Rheumatic and Genetic Diseases. The student acquires experience indepth in the recognition and care of patients with generalized connective tissue diseases and metabolic arthropathies. He works-up and follows patients on wards and in the clinic. Daily rounds with the staff extend his experience. He learns specialized laboratory and clinical techniques. Full time nine weeks recommended. May be taken for 4 units credit. Student spends full time on unit for 4½ weeks; 4½ weeks on another course by agreement with that instructor. Every term. Weight: 4 or 8. *Kelley, Kerby, Roberts, Wyngaarden, Kredich, Chavin, Snyderman, and McLees*

MED-229(C). Nephrology. Fundamental and clinical aspects of nephrology, renal physiology, hypertension, renin-angiotensin metabolism, and disorders of salt and water metabolism. Full clinical participation on inpatient and outpatient services and the dialysis-transplantation service is offered. Attendance at several scheduled rounds, conferences, and seminars is required. Every term. Weight: 8. *Robinson, Clapp, Gunnells, Gutman, Tisher, and Yarger*

MED-231(C). Clinical Hematology and Oncology. Unique opportunity to participate actively in care and study of patients with wide variety of hematologic diseases, anemias, bleeding disorders, leukemias, lymphomas, and secondary gout, etc. Systematic, quantitative clinical evaluation, and basic techniques of blood and marrow examination, serum and urine protein studies. Every term. Weight: 8. *Rundles, Silberman, Rosse, Miller, Kremer, Huang, Logue, and Laszlo*

MED-233(C). Clinical Immuno-hematology. This course is designed to provide clinical and diagnostic laboratory experience in the evaluation and treatment of patients with hematologic disorders characterized by abnormalities of the immune system. The course is integrated in part with Clinical Hematology and Oncology (MED-232). A special opportunity to study blood banking problems, coagulation problems, and clinical problems in immune lysis will be provided. Every term. Weight: 6 to 8. *Rosse, Logue, Silberman, and Rundles*

MED-234(C). Metabolic-Genetic Disease Seminar. This course will explore in detail clinical, metabolic, and genetic information on inborn errors of metabolism. It will include patient presentations, staff lectures, student seminars, and textbook and literature reading. The group will be small enough to permit maximal personal interaction. Term: 3. Weight: 5. *Wyngaarden, Sidbury, Appel, Kelley, Kredich, Neelon, Rosse, Tourian, and Staff*

MED-236(C). Research Topics in Endocrinology and Metabolism. Research training and experience in the field of endocrinology and metabolism. This is arranged individually between the student and a specific member of the endocrine staff. Every term. Weight: 8. *Lebovitz, Feldman, Neelon, and Staff*

MED-237(C). Metabolic Response to Disease. This seminar series deals with the integrative aspects of the endocrine-metabolic response to disease states. Representative topics include the events involved in adapting to feeding, fasting, injury, surgery, infection, and certain medical disorders (i.e., diabetes and hypoglycemia). Term: 4. Weight: 1. *Lebovitz, Feldman, McPherson, Ellis, Neelon, and Staff*

MED-242(C). Clinical Cardiology (Duke Hospital). Broad experience in the clinical aspects of cardiovascular disease is provided by participation in patient care, consultation service, and diagnostic facilities of the Cardiovascular Division. Specific experience is available in electrocardiography, phonocardiography, and exercise stress testing. Patient responsibility is acquired either through responsibility for patients on the inpatient service or through consultations. These clinical activities are complemented by a daily teaching conference covering electrocardiography, patient presentations, and cardiovascular radiology and pathology. Every term. Weight: 8. *Wallace, Orgain, Floyd, Whalen, Morris, Greenfield, and Chen*

MED-244(C). Clinical Cardiology (V. A. Hospital). Fundamentals of electrocardiography, vectorcardiography, and indirect diagnostic techniques in cardiology. Clinical cardiology is emphasized during daily cardiology rounds with the senior staff. Two one-hour periods each week are spent with Dr. Harvey Estes, concentrating on physical diagnosis in the cardiac patient; one hour each week is spent with Dr. John T. Boineau also concentrating on the physical diagnosis. Two weeks with direct patient responsibility are spent on the coronary care unit. Students are asked to follow their patients through cardiac catheterization, pulmonary angiography, and DC cardioversion, when appropriate. EKG reading with supervision is done daily. Every term. Weight: 8. *Walston, Greenfield, McKee, Kendall, Estes, and Boineau*

MED-246(C). Clinical Cardiovascular Physiology. Physiologic measures and anatomic details at cardiac catheterization used to teach principles of physical diagnosis, clinical management and interpretation of pathophysiology in congenital, rheumatic and coronary artery disease. Patients assigned with responsibilities for initial evaluation, physical examination, thorough and detail laboratory study and interpretation. Every term. Weight: 8. *Morris, Kong, Peter, Behar, Walston, and Chen*

MED-250(C). Allergy and Clinical Immunology. Preceptorship in the laboratory evaluation of patients with immuno-physiologic alterations. A review of basic immunology relevant to patient care is reinforced by application to clinical problems available on ambulatory and ward services. An indepth clinical exploration of disease-related immunologic problems and understanding of relevant literature is the basis of an assigned term paper. Every term. Weight: 8. *Buckley and Nagaya*

MED-252(C). Physiology of Nephrology. This course is composed of lectures designed to provide insight into the pathophysiology of clinical fluid and electrolyte problems. An attempt is made to integrate established physiologic principles into an analysis of common clinical problems. It is the intent of this course to equip the student with sufficient general information to permit him to adapt fluid and electrolyte therapy to the great variety of specific patient-related problems which he will encounter as a house officer. Term: 2. Weight: 1. *Clapp and Gutman*

MED-254(C). Enterohepatic Circulation and Lipoprotein Metabolism. There will be detailed explorations of biological and related clinical aspects of hepatic and intestinal functions. The course will be structured chiefly through lectures and relevant patient presentations. Term: 3. Weight: 2. *Tyor, Lack, Young, Quarfordt, McLeod, Mansbach, and Garbutt*

MED-256(C). Ambulatory Patient Care. The student is assigned to the outpatient department and the emergency room and will see patients assigned to him and to a colleague house officer. He may design an individualized outpatient/emergency room schedule which will permit him to have a specific balance of patients with acute and chronic illness. Every term: Weight: 1 to 8. *Dixon, Brewer, and Staff*

MED-258(C). Introduction to Bronchopulmonary Disorders and Tuberculosis. The course is designed to provide a broad experience in the clinical

and laboratory diagnosis of bronchopulmonary diseases and tuberculosis. Emphasis will be placed on learning through active participation in patient care and through correlations of physiologic, radiologic, and pathologic data with disease processes. Every term. Weight: 8. *Cooper, Harle, Kilburn, Kylstra, Pratt, Saltzman, and Sieker*

MED-260(C). Clinical Infectious Disease. This course will provide experience in the clinical and laboratory diagnosis of infectious diseases and their therapy. Emphasis will be placed on learning through active participation in infectious disease consultations and library research. Every term. Weight: 8. *Cate, Hamilton, Suydam Osterhout, Wilfert, and Zwadyk*



Microbiology and Immunology

Professor: W. K. Joklik, Ph.D. (Univ. of Oxford, England, 1952), *Chairman*.

Professors: James B. Duke Professor D. Bernard Amos, M.D. (Guy's Hospital, London, 1963), James B. Duke Professor Norman F. Conant, Ph.D. (Harvard, 1933), Eugene D. Day, Ph.D. (Delaware, 1952), John E. Larsh, Jr., Sc.D. (Johns Hopkins, 1943), Hilda P. Willett, Ph.D. (Duke, 1949).

Associate Professors: Charles E. Buckley, M.D. (Duke, 1954), Richard O. Burns, Ph.D. (Illinois, 1962), Richard S. Metzgar, Ph.D. (Buffalo, 1959), Suydam Osterhout, M.D. (Duke, 1949), Ph.D. (Rockefeller Inst., 1959), Wendell F. Rosse, M.D. (Chicago, 1958), H. F. Seigler, M.D. (North Carolina, 1960), Robert W. Wheat, Ph.D. (Washington Univ., 1955).

Associate Professor: Adjunct James J. Burchall, Ph.D. (Illinois, 1963).

Assistant Professors: Dani P. Bolognesi, Ph.D. (Duke, 1967), Rebecca H. Buckley, M.D. (North Carolina, 1958), David J. Lang, M.D. (Harvard, 1958), Peter K. Lauf, M.D. (Univ. of Freiburg, 1960), Ronald B. Luftig, Ph.D. (Chicago, 1967), Jack L. Nichols, Ph.D. (Univ. of Alberta, Canada, 1967), Samuel R. Oleinick, M.D. (Michigan, 1955), Ph.D. (Pennsylvania, 1961), D. W. Scott, Ph.D. (Yale, 1969), R. E. Smith, Ph.D. (Colorado, 1968), T. C. Vanaman, Ph.D. (Duke, 1968), F. E. Ward, Ph.D. (Brown, 1965), Catherine M. Wilfert, M.D. (Harvard, 1962), H. J. Zweerink, Ph.D. (Cornell, 1967).

Associate: W. K. Smith, M.D. (Johns Hopkins, 1963).

Research Associates: P. Bergoc, M.D., G. Berke, Ph.D., D. Bowser, Ph.D., K. Cheung, Ph.D., C. Decedue, Ph.D., S. Eguro, Ph.D., R. Floyd, Ph.D., T. Graf, Ph.D., Y. Ito, M.D., M. Lai, Ph.D., G. Luginbuhl, Ph.D., P. McMillan, Ph.D., T. Matsuhisa, Ph.D., D. Mickey, Ph.D., E. Ornellas, Ph.D., D. Pett, Ph.D., A. Schincariol, Ph.D., K. Stone, Ph.D., M. Weibe, Ph.D.

Instructors: H. Craig, J. Dawson, Ph.D., E. Grothaus, Ph.D., G. Hill, Ph.D., A. Proctor, M.S., L. Wilson, Ph.D.

Required Course

MIC-200—the core course for all freshman medical students is given in the second semester of the first year. An intensive study is made of the common bacteria, viruses, fungi, and parasites which cause disease in man. The didactic portion of the course focuses on the nature and biological properties of microorganisms causing disease, the manner of their multiplication, and interaction with the entire host as well as at the cellular level. The nature of induced immune processes by active and passive immunization and chemotherapy are included.

The laboratory portion of the course is designed to acquaint students with the methods and procedures employed in bacteriological laboratories, to provide the basis for an understanding of cell-virus interactions, and to demonstrate the nature of the more common pathogenic fungi and parasites. Clinical case histories are presented by the clinical staff to correlate this course with patient care.

Electives

***MIC-215(B). Bacteriophage: Structure and Function.** Classical experiments of Luria, Hershey, and Delbruck. Timing of events during infection. Morphogenesis of component substructures and their subsequent assembly into mature virions. Analysis of electron micrographs. Interactions of bacteriophage with host cell walls and membranes. These areas will be covered in the context of T-even coliphages. Transcriptional and translational processes in coliphage infection such as with R17, fd, ϕ X-174, and λ . Listed in Genetics Program. Terms: 1 and 2. Weight: 2. *Luftig and Nichols*

***MIC-252(B). General Animal Virology.** The structure and replication of mammalian viruses with emphasis on the molecular and functional aspects. Particular attention will be paid to those virus host systems which possess features

which can be exploited for answering questions of universal interest. Terms: 1 and 2. Weight: 2. *Joklik and Zweerink*

***MIC-281(B). Bacterial Physiology I.** The structure, composition, growth, and metabolism of bacterial cells with emphasis on the biochemical and regulatory aspects. Terms: 1 and 2. Weight: 3. *Wheat and Willett*

***MIC-282(B). Bacterial Physiology II.** Continuation of Bacterial Physiology I. Terms: 3 and 4. Weight: 3. *Burns*

***MIC-291(B). Immunology I.** Structure and function of immunoglobulins. Characteristics of synthetic and natural antigens. Cellular aspects and kinetics of antibody formation. Forms of immunologic responsiveness. Elicitation and control of immune response. Phylogeny and ontogeny of immunity. Specificity and cross-reactivity. Methods of immunologic analysis. Tolerance, enhancement, autoimmunity, and allergy. Terms: 1 and 2. Weight: 4. *Scott, Amos, and Day*

***MIC-292(B). Immunology II.** Continuation of Immunology I. Terms: 3 and 4. Weight: 4. *Amos and Scott*

MIC-304(B). Basic Medical Virology. Introduction to the molecular biology of major virus groups; cellular and host responses to, and the epidemiology and pathogenesis of, viral infections; DNA and RNA tumor viruses and their possible role in malignancy; bacteriophage as model systems. Terms: 3 and 4. Weight: 2. *Zweerink, Lang, and Staff*

***MIC-325(B). Medical Mycology.** Intensive study of these fungi which cause disease in man and animals, and will emphasize the diagnosis and treatment of fungus infections as well as give special attention to the epidemiology and public health significance of the fungi. Term: month of July. Weight: 4. *Conant*

MIC-330(B). Medical Immunology. Basic study of immune responses to antigenic substances. Special topics: congenital and acquired immunological deficiencies; humoral and cellular hypersensitivity; immunology and infectious diseases, immunohematology; autoimmune diseases; the immunogenetics of transplantation; tumor specific immunity. Case presentations where indicated and student seminars. Terms: 3 and 4. Weight: 6. *Amos, C. Buckley, R. Buckley, Oleinick, Rosse, and Seigler*

MIC-339(B). Diagnostic Microbiology and Infectious Diseases. Introduction to the methods for the laboratory diagnosis of infectious disease and their clinical application. Every term. Weight: 8. *Osterhout*

***MIC-386(B). Viral Oncology.** Topics will include a review of the nature of cancer, the theories of carcinogenesis, cancer in humans, and chemical and viral carcinogenesis. The emphasis will be on developing an understanding of the experimental approach to cancer, which currently involves the induction of cancer by viruses and chemicals. The course will be informally structured, with lectures restricted to introductory material, and student participation geared to in-depth understanding. Terms: 3 and 4. Weight: 2. *Smith*

MIC-399(B). Preceptorship in Microbiology and Immunology. An individual reading and/or laboratory course in specialty areas supervised by an individual faculty member. Acceptance, nature of topic, and amount of credit by individual arrangement with proposed faculty member. Every term. Weight: 1 to 8 per 9 weeks. *Microbiology and Immunology Staff*

MIC-401(B). Pathophysiology of Infectious Diseases. Lecture and seminar course concerning mechanisms by which infectious agents cause disease in various organs, and the diagnosis, treatment and prevention of such illnesses. Term: 4. Weight: 3. *Wilfert, Katz, Buckley, Cate, Lang, Osterhout, and Griffith*

MIC-403(B). Investigative Problems in Disease Caused by Viruses and Mycoplasmas. Introduction to techniques for research with viruses and mycoplasmas; clinical experience with infectious diseases related to the investigative programs. Terms: 1, 2, or 3. Weight: 8. *Cate, Katz, and Lang*

MIC-405(B). Research in Immunohematology. The course is designed to provide the opportunity for students to select a project involving immunochematologic techniques and to pursue, through original research, the project conclusion. In particular, projects concerned with complement, red cell lysis and red cell antigens will be stressed. Close supervision will be provided. Weekly seminars in Immunohematology will be held. Library readings will be stressed. Terms: 1, 2, 3, or 4. Weight: 6 to 8. *Rosse*

***MIC-411(B). Molecular and Cellular Bases of Development and Differentiation.** The advantages offered by recent advances in Cellular Molecular Biology will be used to gain insight into the processes of development and differentiation. The interdisciplinary nature including studies at all levels should provide a firm foundation to understand the true nature of man and disease. Topics of the course include: Initiation of Development, Morphogenesis, Developmental Genetics, Stable and Labile Differentiation, Altered Cell Properties, and Nucleocytoplasmic Interactions. A seminar is offered as an extension of the subject matter. Terms: 1 and 2. Weight: 3 to 4. *Counce, McCarty, Moses, Adelman, Kaufman, Luftig, Sommer, Harris, Johnson, and Padilla*

***MIC-420(B). Cellular Immunophysiology.** This course will discuss the components of the erythrocyte membrane: protein, lipids and carbohydrates, as they are known to participate in the formation of a membrane matrix capable of important functions such as transport of small molecules. Within the framework of this course it will be possible to show how immunologically active macromolecules affect physiological functions. (See also *PHS-420B). Terms: 3 and 4. Weight: 2. *Lauf and Staff*

The following courses, offered by the Department of Microbiology, *will not* be taught during the 1972-73 academic year. They are listed below for informational purposes in planning future schedules:

***MIC-311(B). Immunochemistry.** The structure of antibodies. The nature of the combining site. Forces involved in antigen-antibody interaction. Specificity, avidity, and cross-reactivity. Antibodies as analytical reagents. Haptens. Synthetic and natural antigens. Biologically active substances as antigens. Terms: 1 and 2. Weight: 3. *Day*

***MIC-336(B). Immunogenetics.** Antigens of tissues and organs, distribution, extraction and chemistry. Phylogeny of iso-antigenic systems of man and animals. Tests for histocompatibility including lymphocyte interactions and reactivity. Change in antigenicity and immune responsiveness in carcinogenesis. Immunologic factors in pregnancy and in homotransplantation of organs. Terms: 1 and 2. Weight: 3. *Amos and Ward*

Obstetrics and Gynecology

Professor: Roy T. Parker, M.D. (Med. Coll. of Virginia, 1944), *Chairman*.

Professor: Charles Peete, Jr., M.D. (Harvard, 1947).

Associate Professors: Robert G. Brame, M.D. (North Carolina, 1955), Arthur C. Christakos, M.D. (Med. Coll. of South Carolina, 1955), Marion C. Crenshaw, Jr., M.D. (Duke, 1956).

Associate Clinical Professors: Eleanor B. Easley, M.D. (Duke, 1944), Richard L. Pearse, M.D. (Harvard, 1931), Kenneth A. Podger, M.D. (Duke, 1941).

Assistant Professors: Nels Anderson, Jr., Ph.D. (Purdue, 1964), William T. Creasman, M.D. (Baylor, 1960), Charles B. Hammond, M.D. (Duke, 1961), Henry G. Magendantz, M.D. (Duke, 1962), David W. Schomberg, Ph.D. (Purdue, 1965).

Assistant Clinical Professors: Trogler F. Adkins, M.D. (Duke, 1936), William A. Graham, M.D. (Pennsylvania, 1932), Donald T. Moore, M.D. (Meharry, 1958).

Associate: W. Allen Addison, M.D. (Duke, 1960), Lee Tyrey, Ph.D. (Illinois, 1969).

Clinical Associates: Thomas A. Stokes, M.D. (Duke, 1955), Roston M. Williamson, M.D. (Med. Coll. of Georgia, 1951).

Research Associates: Claudius P. Jones, Louise A. Kaufman, B.A.

Required Courses

The first year student receives instruction in the fundamentals of obstetric and gynecologic history and pelvic examinations during the course, the Introduction to Clinical Medicine.

OBG-202—required of all second year students—consists of seven weeks in general obstetrics and gynecology. Students attend lectures, work daily in the general and special outpatient clinics, and are assigned patients on the obstetric and gynecologic wards. Students share in patient care, teaching exercises, and the senior faculty participate in daily tutorial sessions. Clinical conferences, a gynecologic-pathology conference, an endocrine conference, and correlative seminars and lectures are included.

Electives

OBG-205(C). Gynecologic Cancer. A survey of malignancy of the reproductive system. The didactic portion of the course is supplemented by presentations of patients currently in therapy on the wards and in the Gynecologic Cancer Clinic. Every term. Weight: 4 or 8. *Creasman, Hammond, and Parker*

OBG-207(C). Pathology: Obstetrical and Gynecological. Study of normal and pathologic processes in the female in the field of obstetrics and gynecology. Current gross and histologic specimens reviewed along with related material in study collections. Clinical, experimental, and theoretical correlations made when applicable. Every term. Weight: 1 or 2. *Brame, Parker, and Gynecology Resident on Surgical Pathology*

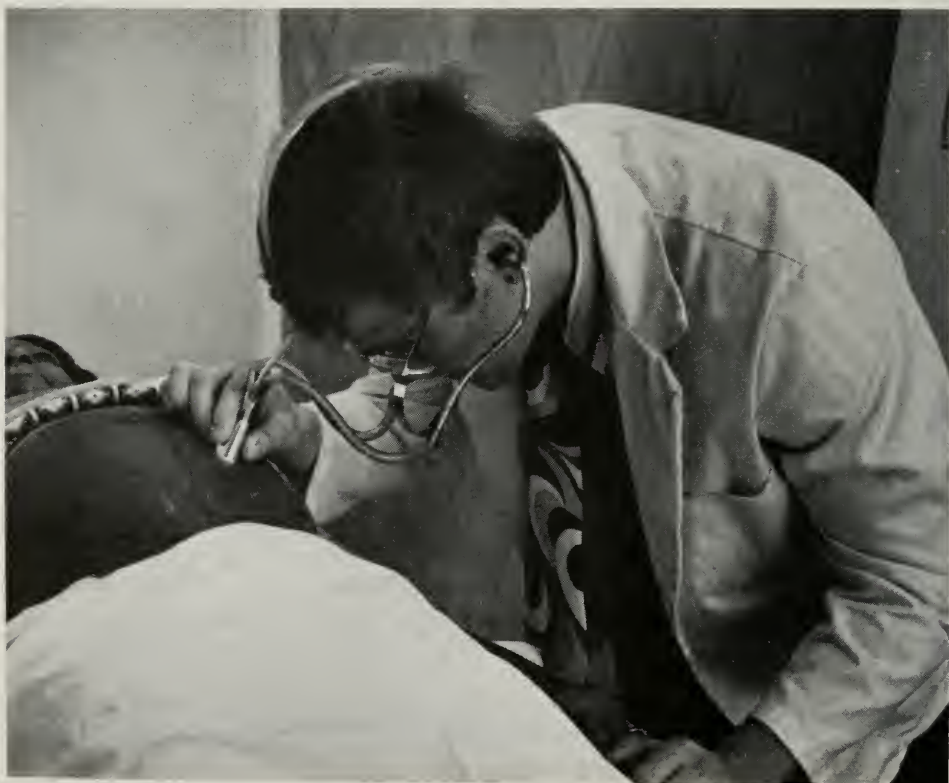
OBG-211(C). Preparation for Practice. For students preparing for: general practice, pediatrics, general surgery, and internal medicine. Inpatient and

outpatient duties as an intern in obstetrics and gynecology. Special lectures in obstetric management and office gynecology with emphasis on good practice techniques. Every term. Weight: 8. *Parker, Brame, and Staff*

OBG-215(C). The Infertile Couple. A clinical study of infertility in the human for students who desire additional instruction in examination, diagnosis and treatment of the infertile couple. Assigned reading of pertinent medical literature both historical and current is correlated with clinical observation in patients. The student is made familiar with testing techniques and the use of required apparatus and instruments, and participates in the treatment of patients. Terms: 1, 2, 3, or 4. Weight: 1. *Magendantz, Hammond, and Peete*

OBG-229(C). Endocrinology Seminar. Sessions with discussion of interesting clinical problems and related clinical and basic research in gynecologic endocrinology. Terms: 1, 2, 3, or 4. Weight: 1. *Hammond, Magendantz, Anderson, Schomberg, Tyrey, and Fellows on Endocrine Division*

OBG-231(C). Basic and Clinical Reproductive Endocrinology. Course for students who desire additional basic and clinical instruction in examination, diagnosis and treatment of obstetric and gynecologic patients with endocrinopathy. Course consists of basic instruction in neuroendocrine and endocrine mechanisms correlated with examination and treatment of patients in the Endocrinology Out-patient Clinic. Every term. Weight: 4. *Hammond, Magendantz, Anderson, Schomberg, Tyrey, and Fellows on Endocrine Division*



OBG-235(C). Cytogenetics. Indepth course in human cytogenetics in which basic techniques of studying human chromosomes are applied to clinical situations. Research in human cytogenetics is also stressed. Terms: 1, 2, 3, or 4. Weight: 3. *Christakos*

OBG-241(C). Family Life Sciences. A clinical correlative study designed to apply contraceptive techniques, genetic counseling, sex education and demography in the practice of obstetrics and gynecology. Social implications in these various areas will be included. Every term. Weight: 4. *Christakos and Brame*

OBG-243(C). Sex Education. This course is designed to prepare health professionals for dealing with situations involving sex education and counseling. The course consists of two parts, a ten week series of training seminars and sensitivity sessions surveying biological, psychological, socio-cultural, and ethical aspects of human sexuality and also providing instruction on techniques of design, organization, and implementation of educational and counseling programs. The final eight weeks of the course will be spent gaining practical experience. The student's project may be of his own design, approved by the Committee, or he may participate in one of the ongoing projects of the Committee such as teaching the seventh grade curriculum in the public schools, writing curricula for other grade levels, or designing a course on the college level. Terms: 1 and 2, or 3 and 4. Weight: 3. *Parker, Katz, Christakos, and Shirley Osterhout*

OBG-245(C). Office Gynecology. For students preparing for: general practice, medicine, pediatrics, and surgery. Outpatient clinic and emergency room diagnosis and patient care are taught. Every term. Weight: 4 or 8. *Parker and Staff*

OBG-247(C). Clinical Obstetrics. For students preparing for: General Practice and Medicine or Pediatrics. Ante-partum, intra-partum and post-partum patient care are stressed and practical experience in the delivery room is provided at an intern level. Every term. Weight: 4 or 8. *Crenshaw and Staff*

OBG-249(C). Clinical Gynecology. For students preparing for general practice, surgery, and urology. Preoperative diagnosis and preparation and post-operative care are stressed. In addition, minor operative procedures are taught and students assume the responsibilities of an intern. Every term. Weight: 4 or 8. *Creasman and Staff*

OBG-251(C). Advanced Reproductive Endocrinology. An indepth program to involve students in detailed study of the clinical and laboratory aspects and literature regarding reproductive biology, endocrinology, infertility, and conception control. Course consists of participation in the gynecologic endocrinology clinics, complicated obstetric clinic, infertility clinics, coed counseling clinic, care of inpatients, and pertinent laboratory exposure to techniques of study of reproductive hormonal substances. Every term. Weight: 8. *Hammond, Magendantz, Anderson, Schomberg, Tyrey, and Fellows on Endocrine Division*

Ophthalmology

Professor: Joseph A. C. Wadsworth, M.D. (Duke, 1939), *Chairman*.

Professor: Myron L. Wolbarsht, Ph.D. (Johns Hopkins, 1958).

Clinical Professor: Hermann M. Burian, M.D. (Belgrade, Yugoslavia, 1930).
 Associate Professors: W. Banks Anderson, Jr., M.D. (Harvard, 1956), Arthur C. Chandler, Jr., M.D. (Duke, 1959).
 Assistant Professors: Maurice B. Landers, III, M.D. (Michigan, 1963), John W. Reed, M.D. (Bowman Gray, 1962).
 Associates: Eva O. Reese, R.N., B.S. (Duke, 1955), Judy H. Seaber, B.A. (Emory, 1962).
 Clinical Associates: Robert E. Dawson, M.D. (Meharry, 1943), Martin J. Kreshon, M.D. (Marquette, 1954), W. Hampton Lefler, M.D. (Bowman Gray, 1963), Samuel D. McPherson, Jr., M.D. (Johns Hopkins, 1943), Noel W. Young, Jr., M.D. (Duke, 1963).
 Clinical Instructor: Larry Turner, M.D. (Duke, 1939).

Electives

OPH-201(C). Investigative Ophthalmology. The student is assigned a project relating to basic ophthalmologic problems. Technical assistance, sufficient equipment, and laboratory animals are supplied for the completion of the project. The student is expected to attend lectures scheduled for the house staff. Every term. Weight: 4 to 8. *Anderson, Landers, and Wolbarsht*

OPH-203(C). General Ophthalmology. A clinical preceptorship in which the student will participate and observe in the regular house staff activities, conferences, lectures, patient care, and treatment including surgery. Emphasis on the use of specialized ophthalmic apparatus is emphasized. Every term. Weight: 3 to 8. *Chandler and Landers*

OPH-205(C). Medical Ophthalmology. The ophthalmic signs and symptoms of systemic disease are presented through patient examination and lectures. Oriented for those students interested primarily in pediatrics, internal medicine, or ophthalmology. Terms: 1, 2, 3, or 4. Weight: 1. *Chandler and Staff*

OPH-207(C). Basic Ophthalmic Sciences. Course designed primarily for those students intending to specialize in ophthalmology and will cover optics, ocular anatomy, physiology, pathology, pharmacology, and numerous ophthalmic



disease processes. Many outstanding guest speakers. Terms: 1, 2, 3, or 4. Weight: 1. *Wadsworth, Staff, and Outside Contributors*

OPH-211(C). Neuro-Ophthalmology. Experience is provided in application of ophthalmic diagnostic technique toward the diagnosis of central nervous system and related ocular diseases. Clinical case and research review is included. Special instrument utilization is emphasized. Terms: 1, 2, 3, or 4. Weight: 1 or 2. *Anderson*

OPH-213(C). Ophthalmic Pathology. The student will review all ophthalmic pathology specimens submitted weekly and any pertinent permanent specimens. He will aid in presentation of cases at weekly ophthalmic pathology conferences. Every term. Weight: 1. *Wadsworth and Klintworth*

OPH-215(C). Ocular Diseases in Children. The study of ocular disease in children includes muscular imbalances, congenital disorders, and neoplastic diseases to acquaint the student with a special pediatric and ophthalmologic phase. Every term. Weight: 1. *Chandler*

Pathology

Professor: Thomas D. Kinney, M.D. (Duke, 1936), *Chairman*, and R. J. Reynolds Tobacco Company Professor of Medical Education and Director of Medical and Allied Health Education.

Professors: Bernard F. Fetter, M.D. (Duke, 1944), Donald B. Hackel, M.D. (Harvard, 1946), Joachim R. Sommer, M.D. (Munich, 1951), Philip C. Pratt, M.D. (Johns Hopkins, 1944), F. Stephen Vogel, M.D. (Case Western Reserve, 1944), Benjamin Wittels, M.D. (Minnesota, 1952).

Associate Professors: William D. Bradford, M.D. (Case Western Reserve, 1958), Jane G. Elchlepp, M.D. (Chicago, 1955), Ph.D. (Iowa, 1948), William W. Johnston, M.D. (Duke, 1959), Gordon K. Klintworth, M.D. (Univ. of Witwatersrand, S. Africa, 1957), Ph.D. (Univ. of Witwatersrand, 1966), Norman B. Ratliff, Jr., M.D. (Duke, 1962), Carlos Kozma, D.M.S. (Buenos Aires, 1952), Adjunct Assoc. Prof.

Assistant Professors: Darell D. Bigner, M.D. (Duke, 1965), Ph.D. (Duke, 1971), Edward Bossen, M.D. (Duke, 1965), Charles A. Daniels, M.D. (Vanderbilt, 1966), Ph.D. (Duke, 1971), Frank Dorsey, Ph.D. (Duke, 1971), Doyle G. Graham, M.D. (Duke, 1966), Harvey J. Sage, Ph.D. (Yale, 1958), George H. Spooner, Ph.D. (University of North Carolina, 1958), C. Craig Tisher, M.D. (Washington Univ., 1961), Frances King Widmann, M.D. (Case Western Reserve, 1960), James W. Wilson, M.D. (Duke, 1967), Ph.D. (Kentucky, 1965), Robert Zipf, M.D. (Ohio State Univ., 1966), Peter Zwadyk, Ph.D. (Univ. of Iowa, 1971).

Associates: Mary S. Britt, M.S. (Bowman Gray, 1967), John T. Daly, M.D. (Cornell, 1968), Edwin L. Kamstock, M.D. (Stritch School of Medicine, 1964), J. E. Phillip Pickett, H.T.

Lecturer: Hugo O. Jauregui, M.D. (Univ. of Buenos Aires, 1963).

Research Associates: Lieselotte Kemper, Eileen M. Mikat, M.A. (Duke, 1969).

Required Course

PTH-200—the core course in pathology—is given during the second term of the first year. Fundamentals of pathology are presented by correlating gross and microscopic material to illustrate the structural changes in disease. Lectures consisting of broad concepts of disease processes are presented by senior faculty and conferences with small groups of students are held under the guidance of staff members. Etiology and pathogenesis of disease as well as the experimental approach are emphasized for the purpose of correlation with clinical disease. In addition to group work, conferences are scheduled to discuss problems derived

from autopsies. Students are required to collaborate in postmortem studies and present cases in clinical-pathologic conferences under the direction of the staff.

Electives

PTH-201(B). The Pathologic Basis for Clinical Medicine. Disease processes will be studied in terms of organ systems, with the intention of enabling students to crystallize the basic processes studied in Pathology 200. Clinico-pathologic correlation will be stressed, utilizing gross and microscopic examples of disease processes, case studies, lectures and demonstrations. Terms: 1 or summer. Weight: 4. *Hackel and Staff*

PTH-203(B). Ophthalmic Pathology. This course is designed for students with an interest in ophthalmic diseases and particularly for those planning a career in pathology or ophthalmology, and will consist of lectures, seminars, and laboratory sessions. The normal anatomy, and embryology of the eye will be reviewed, and the various reactions of the eye to injury will be studied in gross and microscopic specimens. The more common diseases will be considered in detail. Term: 1. Weight: 3. *Klintworth*

PTH-209(B). Ob-Gyn Pathology and Cytology of Other Body Sites. In addition to pathology of the female genitourinary system, this course is designed to explore in detail the role played by clinical exfoliative cytopathology in the diagnosis of disease. Classroom and laboratory work will include diseases involving the female genital tract, upper and lower respiratory tract, urinary tract, body cavities, GI tract, and central nervous system. Emphasis will be on neoplastic disease. Practical application of the acquired knowledge will be made in examining current clinical material. Microscopes required. Term: 1. Weight: 3. *Johnston and Staff*

PTH-210(B). Basic Oncology. The course consists of two seminars a week conducted by an interdepartmental faculty. The seminars are concerned with the basic aspects of oncology and with clinical correlates. The student will also work within the supervision of a faculty member in an area germane to the basic problems of cancer. The student must make appropriate arrangements through Dr. Johnston for faculty supervision prior to the beginning of the course. Terms: 1 or 3. Weight: 8. *Johnston and Staff*

PTH-223(B). Autopsy Pathology. Students work directly with one or more members of the pathology department. They will first assist at autopsies and then perform a limited number of autopsies under supervision. They will be required to work up these cases with particular attention to correlations with clinical and experimental medicine and to present their findings at staff conferences. Every term. Weight: 8. *Pathology Staff*

PTH-225(B). Cardiovascular Pathology. Cardiovascular disease processes will be studied, reviewing anatomic, embryologic and physiologic features, and utilizing case material and gross and microscopic specimens. Consideration will be given to the electrocardiogram. Term: 1. Weight: 2. *Hackel, Estes, Ratliff, and Wilson*

PTH-237(B). Surgical Pathology. This course is designed for the student

who wishes more experience in the study of disease. Although the course is entitled Surgical Pathology, this does not imply interest solely in the individual oriented to Surgery. Problems in Dermatology, Gynecology, Orthopaedics, General Surgery, Internal Medicine, and other specialties will be considered. The program of study will consist of lectures, demonstrations and laboratory work. Term: 4. Weight: 4. *Fetter*

PTH-342(B). Special Topics in Pathology. Special problems in pathology will be studied with a member of the senior staff; the subject matter will be individually arranged. Every term. Weight: 1 to 8 per 9 weeks. *Kinney and Staff*

***PTH-346(B). Subcellular and Molecular Pathology.** This course is designed for students wishing to broaden their knowledge of cellular structure and cellular pathology. Course consists of a series of lectures and seminars discussing the alterations in cellular structure and associated function that accompany cell injury. Terms: 1 and 2. Weight: 3. *Sommer*

PTH-348(B). Applied Surgical Pathology. This course will be in the form of an apprenticeship in which the student will become engaged in the actual preparation and diagnosis of tissue changes. Every term. Weight: 8. *Fetter and Staff*

***PTH-352(B). Biochemical Pathology.** In a series of seminars, the morphology of several disease states will be integrated with their biochemical abnormalities. Utilization of experimental models on resolving the related problems in pathogenesis will be discussed. Disorders in lipid metabolism will be emphasized. Term: 2. Weight: 2. *Wittels*

***PTH-353(B). Advanced Neuropathology.** A review of neuropathology emphasizing correlation with problems of human disease. Term: 1. Weight: 3. *Vogel and Klintworth*

PTH-362(B). Pathology of the Kidney. This course will be a comprehensive study of pathological, immunological and clinical features of the glomerulonephritides, nephrotic syndrome, nephroses, and pyelonephritis as well as of metabolic, congenital, and neoplastic renal disorders. Lectures will be supplemented with gross and microscopic specimens, demonstrations, and special library studies. Term: 2. Weight: 2. *Tisher and McCoy*

PTH-364(B). Orthopaedic Pathology. Special problems in orthopaedic pathology will be dealt with beginning with a discussion of the development of connective tissue with special emphasis on bone and muscle. Bone tumors, metabolic diseases and traumatic problems will be considered. Term: 4. Weight: 2. *Sommer*

PTH-366(B). Pulmonary Pathology and Postmortem Pathophysiology. Emphasis will be on pulmonary pathology and pathophysiology of infectious, metabolic, environmental and neoplastic diseases, and certain diseases of unknown etiology (e.g., sarcoid, alveolar proteinosis, etc.). Ventilatory experiments will be done on excised human lungs. Term: 2. Weight: 3. *Pratt*

PTH-368(B). Neonatal and Pediatric Pathology. This course covers the developmental anatomy and major pathologic processes of the brain, heart, lung,

gastrointestinal, and urinary tracts. Emphasis is placed on clinico-pathologic correlation, and students assume responsibility for presentation of clinico-pathologic conferences, seminars, gross and microscopic laboratory materials. Designed for students entering clinical pediatrics and pathology. Term: 2. Weight: 3. *Bradford and Wilson*

PTH-372(B). Environmental Diseases. The course features local and national guest lecturers and student presentations to cover examples of disease produced by technological exploitation of the earth, social pressures and "life style." Subjects include power, population, food chains, respiration-air and ocean, and examples of diseases due to asbestos, lead, mercury, hydrocarbons, carcinogens, organic dusts, DDT, cigarette smoke, estrogens, etc. Term: 3. Weight: 2. *Pratt, Kilburn, and Lynn*

PTH-374(B). Pulmonary Structure and Function Seminar. Current and exemplary pathological material on lungs, including gross, histologic and electron microscopic data, is correlated with *in vitro* function and clinical features; physiological measurements; and roentgenographic findings. The structural features of the types of reaction of lung cells to injury are interpreted against this background. Such demonstration material is correlated by lectures. Every term. Weight: 1. *Pratt and Kilburn*

PTH-376(B). Pathology of Virus Infections. In this course the pathological effects of viruses will be discussed. The format will consist of a series of lectures and seminars concerning structural, biochemical, and functional alterations associated with virus-cell interactions. Clinical pathological correlation will be stressed. Student participation will be required. Terms: 3 and 4. Weight: 4. *Daniels and Bradford*

PTH-378(B). Seminars in Hematology. This is a systematic survey of the pathophysiology and morphology of human hematological diseases. Each student will survey the literature on several topics and prepare an oral presentation which will be critically discussed by the group. Opportunity for experience in blood, marrow, and lymph node analysis will be available. Terms: 3 or 4. Weight: 2. *Wittels*

***PTH-379(B). Seminar in Ophthalmic Pathology.** The course will be tailored to the interests of the participating students, and will consist of seminars on the common diseases of the eye. The nature, etiology, and pathogenesis of the ocular manifestations of systemic disorders will be stressed. Term: summer. Weight: 2. *Klintworth*

***PTH-411(B). Molecular and Cellular Bases of Development and Differentiation.** The advantages offered by recent advances in Cellular Molecular Biology will be used to gain insight into the processes of development and differentiation. The interdisciplinary nature including studies at all levels should provide a firm foundation to understand the true nature of man and disease. Topics of the course include: Initiation of Development, Morphogenesis, Developmental Genetics, Stable and Labile Differentiation, Altered Cell Properties, and Nucleocytoplasmic Interactions. A seminar is offered as an extension of the subject matter. Terms: 1 and 2. Weight: 3 to 4. *Counce, McCarty, Moses, Adelman, Kaufman, Luftig, Sommer, Harris, Johnson, and Padilla*

Pediatrics

Professor: Samuel L. Katz, M.D. (Harvard, 1952), *Chairman*.

Professors: Jay M. Arena, M.D. (Duke, 1932), Susan C. Dees, M.D. (Johns Hopkins, 1934), William J. A. DeMaria, M.D. (Duke, 1948), James B. Sidbury Professor Jerome S. Harris, M.D. (Harvard, 1933), Angus M. McBryde, M.D. (Pennsylvania, 1927), F. Stanley Porter, M.D. (Johns Hopkins, 1952), James B. Sidbury, Jr., M.D. (Columbia, 1947), Madison S. Spach, M.D. (Duke, 1954).

Associate Professors: John P. Boineau, M.D. (Duke, 1959), Ramon V. Canent, M.D. (Santo Tomas, Phillipines, 1957), John F. Griffith, M.D. (Saskatchewan, 1958), Herman Grossman, M.D. (Columbia, 1953), Marcel Kinsbourne, B.M. (Guy's Hospital, London, 1955), Ph.D. (Oxford Univ., England, 1963), David J. Lang, M.D. (Harvard, 1958), Donald Silver, M.D. (Duke, 1955), Alexander Spock, M.D. (Maryland, 1955).

Assistant Professors: Roger C. Barr, Ph.D. (Duke, 1968), William D. Bradford, M.D. (Western Reserve, 1958), George W. Brumley, Jr., M.D. (Duke, 1960), Rebecca H. Buckley, M.D. (North Carolina, 1958), M. C. Crenshaw, Jr., M.D. (Duke, 1956), John A. Fowler, M.D. (Bowman Gray, 1946), Stuart Handwerker, M.D. (Maryland, 1964), Harold J. Harris, M.D. (Long Island Col. of Med., Brooklyn, 1949), M. M. Jarmakani, M.D. (Damascus, 1962), Paul H. Jewett, M.D. (Stanford, 1962), J. David Jones, M.D. (Duke, 1954), Ronald P. Krueger, M.D. (Duke, 1965), George M. Lyon, M.D. (Duke, 1961), Lois A. Pounds, M.D. (Pittsburgh, 1965), A. W. Renuart, III, M.D. (Duke, 1955), Charles R. Roe, M.D. (Duke, 1964), Malcolm H. Rourk, Jr., M.D. (Pennsylvania, 1963), Catherine M. Wilfert, M.D. (Harvard, 1962).

Associates: Lillis Altschuller, M.D. (Cincinnati, 1960), Vasudev C. Joshi, Ph.D. (Indian Inst. of Science, Bangalore, India), Deborah Kredich, M.D. (Michigan, 1962), E. Croft Long, Ph.D. (London, 1957), Shirley K. Osterhout, M.D. (Duke, 1957), Martha Perry, Ph.D. (Syracuse, 1970), Karl Stevenson, M.D. (Bowman Gray, 1966).

Clinical Professor: A. H. London, M.D. (Pennsylvania, 1927).

Associate Clinical Professors: W. L. London, M.D. (North Carolina, 1955), H. G. Noller, M.D. (Heidelberg, 1950), T. D. Scurletis, M.D. (Pittsburgh, 1951), Bailey D. Webb, M.D. (Duke, 1946), Ph.D. (North Carolina, 1941).

Assistant Clinical Professors: John T. King, M.D. (Med. Coll. of Virginia, 1945), Charles B. Neal, M.D. (Duke, 1955), A. Douglas Rice, M.D. (Duke, 1951), Evelyn Schmidt, M.D. (Duke, 1951), S. W. Singleton, M.B. (Manchester, England, 1952), W. Samuel Yancy, M.D. (Duke, 1965).

Clinical Associates: Clarence Bailey, M.D. (North Carolina, 1958), W. A. Cleland, M.D. (Howard, 1933), Nelle S. Moseley, M.D. (Med. Coll. of Georgia, 1957), James B. Rouse, M.D. (Duke, 1965).

Required Course

PED-200—the basic course in pediatrics for all students—is a seven week clerkship in the second year. Its principal aim is to provide the student a perspective and context from which to study health and illness of infants and children. Primary attention is directed to experience in the acquisition and organization of information obtained by history-taking, physical examination, and laboratory study. Students work with patients in the clinics, nurseries, and wards under the guidance of a senior teaching resident, faculty, and house staff. Conferences, teaching rounds, and consultations supplement the basic experience in patient contact and care. Interdisciplinary teaching exercises with members of the Departments of Obstetrics, Pathology, and Radiology are also included in the clerkship. Emphasis is placed upon a pathophysiological approach to altered human developmental biology. The clerkship is also intended to provide an introduction to pediatrics so that students may gain insight into the exciting opportunities in the field.

Electives

PED-201(C). General Pediatrics. Student is assigned to the ward, ambulatory services, and/or nurseries according to his interests and goals. In general,

he will have an intensive apprenticeship in Pediatrics with learning experiences stemming directly from the patient and his problems. Every term. Weight: 8. *Katz and Pediatric Staff*

PED-202(C). Pediatric Infectious Diseases. This course will provide experience in the clinical and laboratory diagnosis of infectious diseases and in their therapy. The student works closely with the infectious disease fellow and participates actively in evaluation of patients. There is opportunity to gain experience in a laboratory setting (bacteriology, virology). Every term. Weight: 8. *Lang, Wilfert, and Staff*

PED-203(C). Pediatric Neurology. Student will examine patients with neurological and convulsive disorders in the wards and clinics of Duke Hospital and in the in-patient facilities of the Murdoch Center. Students will be given the opportunity to do research with the staff members. Terms: 1, 2, 3, or 4. Weight: 8. *Kinsbourne, Griffith, Renuart, and Staff*

PED-209(C). Pediatric Endocrinology. Student sees clinical endocrine patients by participation in Pediatric Endocrine Clinics. Stress is placed upon application of hormone assay to the diagnosis of endocrine disorders in childhood. Every term. Weight: 8. *Handwerker and Moseley*

PED-215(C). Metabolic Disorders in Children. Outpatient and inpatient study of a variety of metabolic disorders. Every term. Weight: 8. *Sidbury and Roe*

PED-217(C). Pediatric Hematology. Includes all aspects of clinical and laboratory pediatric hematology with emphasis on fundamental concepts as related to hematologic disorders. There will be daily ward rounds, a weekly clinic, weekly slide conferences, and weekly seminars, as well as assigned reading. Students will be encouraged to engage in some individual clinical or laboratory project during the period of the course. Every term. Weight: 8. *Porter and Lyon*

PED-221(C). Poison Control. Student participates in the clinical functions of the Center. He will be on call for the treatment of these cases in the Emergency Room or Ward. He will discuss each case with the Director. Two hourly conference sessions per week will be scheduled. Terms: 1, 2, 3, or 4. Weight: 2. *Shirley Osterhout and Arena*

PED-223(C). Preceptorship in Pediatrics. This course gives insight into the management of pediatric practice especially as related to infancy. Experience with a practicing pediatrician will be provided. Students will be expected to participate in newborn and premature rounds at Duke and Watts Hospitals, in well-baby conferences and in the High Risk Prenatal Clinic. Terms: 2 or 3. Weight: 6. *McBryde, A. London, W. London, and Staff*

PED-225(C). Neonatology. Students will have patient care responsibilities and experience in the Full Term Newborn and Intensive Care Nurseries. Included will be discussions of prenatal hazards, resuscitation, care of the normal newborn and premature infant. Emphasis is placed on the initiation of parent-child relationships, breast feeding and the management of the normal and stressed neonate. Terms: 3 or summer. Weight: 8. *Brumley*



PED-227(C). Behavioral Aspects of Pediatric Illness. The purpose of this course is to introduce the student to the emotional aspects of sick children. Experience will include the impact on the family as well as the psychic and somatic adjustments of the child. (See also PSC-227C.) Every term. Weight: 3. *Jones, Stevenson, Perry, and Driscoll*

PED-231(C). Clinical Pediatric Cardiology. Provides an intensive learning experience in clinical childhood heart disease. Scope: history, physical examination, and special techniques (electrocardiography, phonocardiography, vectorcardiography, cardiac catheterization and cineangiocardiology). Every term. Weight: 8. *Canent, Spach, and Staff*

PED-233(C). Allergy, Clinical Immunology and Pulmonary Diseases. Clinical evaluation and practice in use of methods of diagnosis and treatment of allergic disorders, cystic fibrosis and other pulmonary diseases, immunologic deficiency states and autoimmune disorders. Scope: history, physical examination, skin and pulmonary function tests, allergen preparation, sweat testing, and a variety of clinical immunologic tests. Every term. Weight: 8. *S. Dees, R. Buckley, Spock, and Rourke*

PED-235(C). Pediatric Oncology. The student will attend daily ward rounds, a weekly conference, and seminars. He will also participate in the diagnostic evaluation, care, and treatment of patients with malignant diseases. The majority of the student's time will be spent in an individual clinical, or laboratory, investigative effort. The exact nature of this project will be determined by the interest and capabilities of the student. Every term. Weight: 8. *Lyons*

PED-239(C). Perinatal Medicine. A study of factors during pregnancy, labor, delivery, and the first month of life. Emphasis will be placed on teratogenic influences, abnormal conditions of pregnancy as related to the infant, prenatal pathological conditions adversely afflicting the fetus and newborn, and early management of the infant. Current problems in maternal-fetal relationships will be outlined. Term: 1 or 4. Weight: 8. *Brumley and Crenshaw*

PED-241(C). Pediatric Nephrology. Course is designed to provide experience in diagnosis, natural history and treatment of acute and chronic disorders of the kidney in children. Students are also exposed to the management of fluid and electrolyte disorders in infants and children. Every term. Weight: 6 to 8. *DeMaria and Krueger*

PED-243(C). Adolescent Medicine. Students will see adolescents in outpatient clinic. Emphasis to be placed on the behavioral and developmental aspects of adolescence, drug abuse, and the pregnant teenager. Tutorial and supervisory time to discuss specific patients and pertinent literature will be arranged. Every term. Weight: 2. *Yancy*

Physiology and Pharmacology

Professor: Daniel C. Tosteson, M.D. (Harvard, 1949), *Chairman*.

DIVISION OF PHYSIOLOGY

James B. Duke Professor: Daniel C. Tosteson, M.D. (Harvard, 1949).

Professors: Jacob J. Blum, Ph.D. (Chicago, 1952), Irving T. Diamond, Ph.D. (Chicago, 1953), Frans F. Jobsis, Ph.D. (Michigan, 1958), Edward A. Johnson, M.D. (University of Sheffield, 1953), John W. Moore, Ph.D. (Virginia, 1954), Eugene M. Renkin, Ph.D. (Harvard, 1951), George F. Somjen, M.D. (New Zealand, 1961).

Visiting Professors: Donald L. Fry, M.D. (Harvard, 1949), Ernest Schoffeniels, M.D. (Universite de Liege, 1953).

Associate Professors: Robert E. Fellows, M.D. (Duke, 1969), Ph.D. (McGill, 1959), Peter K. Lauf, M.D. (University of Freiburg, 1960), E. Croft Long, M.B., B.S., Ph.D. (London, 1952, 1957), Thomas J. McManus, M.D. (Boston, 1955), George M. Padilla, Ph.D. (UCLA, 1960), John V. Salzano, Ph.D. (Iowa, 1964).

Assistant Professors: Nels C. Anderson, Ph.D. (Purdue, 1964), Reginald Carter, Ph.D. (Bowman Gray, 1970), Balz F. Gisin, Ph.D. (University of Basel, 1967), Robert B. Gunn, M.D. (Harvard, 1966), John Gutknecht, Ph.D. (UNC, 1963), R. Gary Kirk, Ph.D. (Yale, 1968), J. Mailen Kootsey, Ph.D. (Brown Univ., 1966), Melvyn Lieberman, Ph.D. (SUNY, Downstate, 1964), Lazero J. Mandel, Ph.D. (Pennsylvania, 1969), Lorne Mendell, Ph.D. (MIT, 1965), Elliott Mills, Ph.D. (Columbia, 1964), Myron Rosenthal, Ph.D. (Duke, 1969), James M. Schooler, Jr., Ph.D. (Wisconsin, 1964), Howard Wachtel, Ph.D. (NYU, 1967).

Associate Clinical Professors: James Clapp, M.D. (UNC, 1957), J. A. Kylstra, M.D. (Leiden, Netherlands, 1952), Myron Wolbarsht, Ph.D. (Johns Hopkins, 1958).

Assistant Clinical Professors: Antonio V. Escueta, M.D. (Univ. of Santo Tomas, Manila, 1963), Carl Gerber, Ph.D. (Washington Univ., 1960), M.D. (Duke, 1967), Joseph Greenfield, M.D. (Emory, 1956), Harold E. Lebovitz, M.D. (Pittsburgh, 1956), David W. Schomberg, Ph.D. (Purdue, 1965), Andrew G. Wallace, M.D. (Duke, 1959).

DIVISION OF PHARMACOLOGY

Professor: Toshio Narahashi, Ph.D. (Univ. of Tokyo, 1960), *Head of Division*

James B. Duke Professor: Frederick Bernheim, Ph.D. (Cambridge, 1928).

Professors: Leon Lack, Ph.D. (Columbia, 1953), Toshio Narahashi, Ph.D. (Univ. of Tokyo, 1960).

Associate Professors: Daniel B. Menzel, Ph.D. (Univ. of California, Berkeley, 1962),

Athos Ottolenghi, M.D. (Univ. of Pavia, Italy, 1946), Saul Schanberg, M.D. (Yale, 1965), Ph.D. (Yale, 1961).

Assistant Professor: Theodore Slotkin, Ph.D. (Univ. of Rochester, 1970).

Clinical Professors: George H. Hitchings, Ph.D. (Harvard, 1933), Charles A. Nichol, Ph.D. (Wisconsin, 1949), Robert A. Maxwell, Ph.D. (Princeton, 1954).

Associate Clinical Professors: Gertrude B. Elion, D.Sc. (George Washington Univ., 1969), Herbert Posner, Ph.D. (George Washington Univ., 1958), Richard M. Welch, Ph.D. (Jefferson Medical College, 1962).

Assistant Clinical Professors: Earl F. Baril, Ph.D. (Connecticut, 1966), G. Douglas Blenkarn, M.D. (Univ. of Toronto, 1958), Howard L. Elford, Ph.D. (Cornell, 1962), Everett Ellinwood, M.D. (UNC-CH, 1959), Robert O. Friedel, M.D. (Duke, 1964), Keith H. Palmer, Ph.D. (Univ. of Paris, 1956).

Required Courses

PHS-200. Physiology of Man. An introduction to the basic concepts of physiology with particular reference to man. Three lectures, one laboratory, and one conference per week. Fall term. 6 units. *Graduate staff*

PHS-201. Pharmacology: Mode of Action of Drugs. Studies and discussion of the pharmacological action of drugs in terms of biochemical and physiological processes. Three lectures and one conference per week. Prerequisite: 200 or equivalent. 4 units. *Graduate staff*

PHS-279. Student Tutorial in Physiology and Pharmacology. An introduction to critical reading of selected papers in physiology or pharmacology. Required of all first-year graduate students. 2 units. *Graduate staff*

PHS-280 Student Seminar in Physiology and Pharmacology. Readings and discussions in depth of several aspects of physiology and pharmacology. Required of all second-year graduate students. 2 units. *Graduate staff*

Electives

PHS-205(B). Peripheral Circulation in Health and Disease. Topics in physiology and pharmacology of peripheral circulation. Analysis and evaluation of experimental and clinical studies relating to selected diseases of the circulation. Not offered for graduate school credit. Term: 2. Weight: 1. *Renkin, Mills, and Carter*

PHS-207(B). The Heart in Health and Disease. Physiology and Pharmacology at the organ systems level, including cardiac electrophysiology, arrhythmias, ventricular-atrial function, congenital disordered function, coronary blood flow and some aspects of developmental physiology. Not offered for graduate school credit. Term: 1. Weight: 1. *Johnson, Renkin, Mills, Wallace, Greenfield, Spach, Boineau, and Jewett*

***PHS-208(B). Respiratory System in Health and Disease.** Primary emphasis is on various aspects of the physiology of respiration. Topics covered include pulmonary mechanics, central and peripheral regulation of ventilation, pulmonary circulation and respiratory responses to exercise, altitude and hyperbaric environments. Terms: 3 and 4. Weight: 2. *Salzano, Kylstra, and Saltzman*

***PHS-209(B). Neuronal Physiology and Pharmacology.** Structure and

function of excitable membranes; impulse generation and conduction in different kinds of nerve; effects of pharmacological agents on electrical properties; physiological and pharmacological aspects of synaptic and neuromuscular transmission; biophysics of receptor cells. Terms: 1 and 2. Weight: 3. *Naraitashi and Staff*

***PHS-212(B). Marine Membrane Physiology.** Physiology of marine and estuarine organisms, with emphasis on cellular transport processes and electrophysiology. The course will include laboratory work on the functions, mechanisms, and comparative aspects of ionic and osmotic regulation in marine plants and animals. Term: summer. Weight: 9. *Gutknecht, Schoffeniels, Wachtel, and Staff*

***PHS-213(B). Cellular and Chemical Pharmacology.** Chemical aspects of cell-drug interaction and structure-activity relationships. Cholinergic mechanisms, pharmacological and applied aspects. Biogenic amines, pharmacological and behavioral aspects. Psychoactive drugs and pharmacology of excitable tissues. Terms: 1 and 2. Weight: 3. *Ottolenghi and Staff*

***PHS-215(B). Topics in Developmental Physiology and Pharmacology.** An analysis of physiological basis of development at the organ level of organization with special reference to vertebrates. Topics will include development of neuronal connections, cardiogenesis, hormonal regulation and pharmacological interactions in organogenesis. Terms: 3 and 4. Weight: 2. *Mendell, Lieberman, and Padilla*

***PHS-216(B). Contractile Processes in Physiology and Pharmacology.** Cellular and molecular basis of activity in cilia and skeletal, cardiac, and smooth muscle; submicroscopic structure of muscle; electrical and ionic properties of muscle membranes; the problem of electro-mechanical coupling; mechanics and thermodynamics of muscular contraction; biochemical energetics of contraction. Terms: 1 and 2. Weight: 3. *Jobsis, Johnson, and Anderson*

***PHS-217(B). Membrane Transport Processes in Physiology and Pharmacology.** Chemical composition and ultrastructure of biological membranes, ionic and osmotic equilibria across the membranes of individual cells, passive and active ionic transport, the role of ATPase, carrier-mediated diffusion of non-electrolytes, integration of transport processes to produce molecular movements across organized epithelia (e.g. amphibian skin and bladder, gastrointestinal mucosa). Terms: 1 and 2. Weight: 2. *McManus, Gunn, Gutknecht, Lauf, Kirk, and Tosteson*

PHS-219(B). Tutorial in Physiology and Pharmacology. Guided independent study of original literature and/or laboratory experience. Open to all students; required of those electing a preclinical base in the Department of Physiology and Pharmacology. Every term. Weight: 3 per 9 weeks. *Fellows and Staff*

PHS-221(B). Introduction to Biological Correlates of Behavior. The course is a selective presentation of current concepts of the biological determinants of behavior. An introduction to autonomic nervous system conditioning and psychophysiological methods is included. (Also listed as PSC-221B.) Term: summer. Weight: 1. *Friedel and Staff*

PHS-223(B). Biological Correlates of Behavior. A survey of current con-

cepts of genetic, anatomical, physiological, neurochemical and pharmacological factors affecting perception, cognition, feeling states, states of awareness and memory is presented. The course includes an analysis of autonomic nervous system conditioning and an introduction to psychophysiological methods. The course also involves laboratory demonstrations, experiments and discussions of principles presented in lectures. (Also listed as PSC-223B.) Terms: 1 and 2. Weight: 4. *Friedel and Staff*

***PHS-330(B). Pharmacological Basis of Clinical Medicine.** This course consists of a detailed analysis of the mechanism of action and rationale for use of pharmacologic agents in disease states. Terms: 1 and 2. Weight: 4. *Schanberg and Staff*

***PHS-331(B). Laboratory Methods in Pharmacology.** Tutorial laboratory training will be given in various fields of pharmacology, including neuropharmacology, cardiovascular pharmacology, biochemical pharmacology and biophysical pharmacology. Certain special laboratory sessions will be conducted at the Wellcome Research Laboratories, Research Triangle Park. Every term. Weight: 3 per 9 weeks. *Narahashi, Maxwell, and Staff*

***PHS-372(B). Research in Physiology and Pharmacology.** Laboratory investigation in various areas of physiology and pharmacology. Every term. Weight: 2 to 8 per 9 weeks. *Fellows and Staff*

***PHS-393(B). Integrative and Clinical Neurophysiology and Neuropharmacology.** Aspects of the physiology and pharmacology of the central nervous system in health and in disease: sensory coding; reflex functions; motor control; effects of drugs on the CNS; physiological aspects of memory. Terms: 3 and 4. Weight: 3. *Somjen and Staff*

***PHS-401(B). Metabolic and Developmental Physiology and Pharmacology.** Cell division and control of the cell cycle; population dynamics; physiology of subcellular organelles such as nuclei, mitochondria, lysosomes, and peroxisomes; metabolic regulation with respect to temperature adaptation and to variations in exogenous substrates; control of development and differentiation in eukaryotic cells. Terms: 1 and 2. Weight: 3. *Blum, Padilla, and Staff*

***PHS-403(B). Endocrinology and Reproduction.** Current concepts of biosynthesis, secretion, and mechanisms of action of hormones. Structural relationships and endocrine regulation at cellular, organ and higher integrative levels. Structure and function of male and female reproduction systems including hormonal mechanisms in pregnancy and parturition. (Also listed as *ANA-403B.) Terms: 3 and 4. Weight: 3. *Anderson, Everett, and Fellows*

***PHS-411(B). Molecular and Cellular Bases of Development and Differentiation.** The advantages offered by recent advances in cellular molecular biology will be used to gain insight into the processes of development and differentiation. The interdisciplinary nature including studies at all levels should provide a firm foundation to understand the true nature of man and disease. Topics of the course include: Initiation of Development, Morphogenesis, Developmental Genetics, Stable and Labile Differentiation, Altered Cell Properties, and Nucleo-

cytoplasmic Interactions. A seminar is offered as an extension of the subject matter. Terms: 1 and 2. Weight: 3 to 4. *Counce, McCarty, Moses, Adelman, Kaufman, Luftig, Sommer, Harris, Johnson, and Padilla*

***PHS-415(B). Physiological Instrumentation.** Electronic methods of measurement of physiological variables. The operational amplifier is used as the active building block in appropriate feedback circuits containing only passive elements to make a wide range of linear instruments including analog computers. Digital logic and computing elements are also developed. Terms: 3 and 4. Weight: 3. *Moore and Staff*

***PHS-420(B). Cellular Immunophysiology.** This course will discuss the components of the erythrocyte membrane: protein, lipids and carbohydrates, as they are known to participate in the formation of a membrane matrix capable of important functions such as transport of small molecules. Within the framework of this course it will be possible to show how immunologically active macromolecules affect physiological functions. (Also listed as *MIC-420B.) Terms: 3 and 4. Weight: 2. *Lauf and Staff*

Psychiatry

J. P. Gibbons Professor: Ewald W. Busse, M.D. (Washington Univ., 1942), *Chairman*.

DIVISION OF CHILD PSYCHIATRY

Professor: John A. Fowler, M.D. (Bowman Gray, 1946), *Head*.

Associate Professors: Ila H. Gehman, Ed.D. (Pennsylvania State, 1947), Harold J. Harris, M.D. (Long Island Med. Coll., 1949), Charles R. Keith, M.D. (Harvard, 1961).

Assistant Professors: Marcelino Amaya, M.D. (Univ. of Nacional Autonoma de Mexico, 1954), William B. Anderson, M.D. (Minnesota, 1948), Thomas M. Haizlip, M.D. (UNC, 1958), J. David Jones, M.D. (Duke, 1954), Karl W. Stevenson, M.D. (Bowman Gray, 1966), Preston A. Walker, M.D. (Medical Coll. of South Carolina, 1959).

Clinical Associate: Lucy T. Davis, Ed.D. (Columbia, 1955).

Instructor: Cesar Guajardo, M.D. (Universidad de Nuevo Leon, 1961).

DIVISION OF ELECTROENCEPHALOGRAPHY AND CLINICAL NEUROPHYSIOLOGY

Professor: William P. Wilson, M.D. (Duke, 1947), *Head*.

Associate Professor: Everett H. Ellinwood, M.D. (UNC, 1959).

Clinical Assistant Professor: Marvin J. Short, M.D. (Duke, 1962).

Instructor: G. LaVonne Brown, M.D. (Duke, 1967).

Research Associate: Abraham Sudilovsky, M.D. (Buenos Aires, 1964).

Geropsychiatry

Professor: Adriaan Verwoerdt, M.D. (Medical School of Amsterdam, 1952).

Associate Professors: Daniel T. Gianturco, M.D. (Buffalo, 1960), Eric A. Pfeiffer, M.D. (Washington Univ., 1960), Hsioh-shan Wang, M.D. (National Taiwan Univ., 1943).

Assistant Professors: Daniel T. Peak, M.D. (Wisconsin, 1959), Dietolf Ramm, Ph.D. (Duke, 1969).

Assistant Clinical Professor: Jesse N. McNeil, M.D. (Arkansas, 1960).

Associates: Roy V. Varner, M.D. (UNC, 1962), Alan D. Whanger, M.D. (Duke, 1956).

DIVISION OF HIGHLAND HOSPITAL

Associate Professor: Charles W. Neville, Jr., M.D. (Vanderbilt, 1956), *Head*.

Assistant Professors: Marie Baldwin, M.D. (Med. Coll. of South Carolina, 1929), Dale T. Johnson, Ph.D. (Vanderbilt, 1966).

Associates: Jack W. Bonner, M.D. (Southwestern, 1965), Hal G. Gillespie, M.D. (Med. Coll. of South Carolina, 1964), James C. Green, M.D. (Illinois, 1965), Elizabeth B. Harkins, M.S.W. (Pittsburgh, 1938), Robert E. Huffman, M.D. (Tennessee, 1963), Anne E. Sagberg, M.D. (Oslo, 1947), Thomas A. Smith, M.D. (Tennessee, 1955).

Instructors: Terrold W. Fox, M.S.W. (Florida State, 1965), Alice N. Jackson, M.S.W. (Western Reserve, 1954), Helen G. Johnson, M.S.W. (Pittsburgh, 1946), Vesta M. Neale, M.S.W. (Bryn Mawr, 1962), Shirley C. Singleton, M.S.W. (Michigan, 1958), Joyce D. Williams, M.S.W. (Florida State, 1968), Olin D. Wilson, M.S.W. (Florida State, 1968).

DIVISION OF INPATIENT SERVICES

Professor: Frederick R. Hine, M.D. (Yale, 1949), *Head*.

Professors: Bernard Bressler, M.D. (Washington Univ., 1942), Hans Lowenbach, M.D. (Hamburg Univ., 1930), John M. Rhoads, M.D. (Temple, 1943).

Associate Professor: George A. Silver, M.D. (Duke, 1938).

Assistant Professors: Johnnie L. Gallemore, Jr., M.D. (Emory, 1964), Robert Friedel, M.D. (Duke, 1964), Z. Daniel Pauk, M.D. (Iowa, 1956).

Assistant Clinical Professor: Pedro J. Irigaray, M.D. (Univ. of Mexico, 1955).

Instructor: David M. Hawkins, M.D. (Duke, 1965).

DIVISION OF MEDICAL PSYCHOLOGY

Professor: Carl Eisdorfer, Ph.D. (New York Univ., 1959), M.D. (Duke, 1964), *Head*; also Professor of Psychiatry.

Professors: Irving E. Alexander, Ph.D. (Princeton, 1949), Lloyd J. Borstelmann, Ph.D. (California, 1950), Robert C. Carson, Ph.D. (Northwestern, 1957), Martin Lakin, Ph.D. (Chicago, 1955), Walter D. Obrist, Ph.D. (Northwestern, 1950), Larry W. Thompson, Ph.D. (Florida State, 1961).

Associate Professors: Edward Clifford, Ph.D. (Minnesota, 1954), Herbert F. Crovitz, Ph.D. (Duke, 1960), Arnold D. Krugman, Ph.D. (Kentucky, 1952).

Assistant Professors: Elaine K. Crovitz, Ph.D. (Duke, 1964), Merrill F. Elias, Ph.D. (Purdue, 1963), W. Doyle Gentry, Ph.D. (Florida State, 1969), Mary M. Huse, Ph.D. (Duke, 1959), Irwin Kremen, Ph.D. (Harvard, 1961), Joan C. Martin, Ph.D. (Florida State, 1965), David W. Novak, Ph.D. (Kentucky, 1968), W. Derek Shows, Ph.D. (Duke, 1967), Russel F. Tomlinson, Ph.D. (Florida, 1957).

Assistant Clinical Professor: Mary W. Headrick, Ph.D. (George Peabody Coll., 1966).

Associates: J. Thomas DeVoge, Ph.D. (West Virginia, 1970), Cebrun Gaustad, Ph.D. (UNC, 1970), Paul M. Kirwin, Ph.D. (Texas, 1968), Richard B. Kramer, Ph.D. (Chicago, 1968), Gail R. Marsh, Ph.D. (Iowa, 1968), Gerard J. Musante, Ph.D. (Tennessee, 1971), Martha A. Perry, Ph.D. (Syracuse, 1970).

Instructor: Linda C. Wyrick, Ph.D. (Arizona, 1971).

Research Associates: Gerda G. Fillenbaum, Ph.D. (London, 1966), Patricia E. Sinicrope, M.A. (Wake Forest, 1970), Frances L. Wilkie, M.A. (Mississippi, 1960).

DIVISION OF MEDICAL SOCIOLOGY

Professor: George L. Maddox, Ph.D. (Michigan, 1956), *Head*.

Professors: Kurt W. Back, Ph.D. (MIT, 1949), John C. McKinney, Ph.D. (Michigan State, 1953).

Associate Professors: Jacquelyne J. Jackson, Ph.D. (Ohio State, 1960), Erdman B. Palmore, Ph.D. (Columbia, 1959).

Assistant Professor: Mary Lee Brehm, Ph.D. (UNC, 1966).

DIVISION OF OUTPATIENT SERVICES

Associate Professor: Charles E. Llewellyn, Jr., M.D. (Med. Coll. of Virginia, 1946), *Head*.

Assistant Professors: D. Robert Fowler, M.D. (Southwestern, 1961), John G. Giragos, M.D. (American Univ. of Beirut, 1963), Kenneth Rockwell, M.D. (Duke, 1961).

Associate: James H. Carter, M.D. (Howard Univ., 1966).

DIVISION OF PSYCHOSOMATIC MEDICINE

Associate Professor: John B. Reckless, M.B., Ch.B. (Univ. of Birmingham, England, 1954), *Head*.

Professor: Joseph B. Parker, Jr., M.D. (Tennessee, 1941).

Associate Professors: Marianne S. Breslin, M.D. (Medical Academy, Duesseldorf, Germany, 1946), C. William Erwin, M.D. (Texas, 1960).

DIVISION OF PSYCHIATRIC SOCIAL WORK

Assistant Professor: Martha L. Wertz, M.S.W. (Tulane, 1952), *Head*.

Associate Professor: Maurine B. LaBarre, M.S.W. (Bryn Mawr, 1934).

Assistant Professor: S. Kathryn Barclay, M.S.W. (Tulane, 1946).

Associates: Hallie M. Coppedge, M.S.W. (UNC, 1958), Chancellor B. Driscoll, M.S.S.W. (Univ. of Louisville, Kentucky, 1951), Maxine R. Flowers, M.S.W. (Columbia, 1964), Frederica C. Harrison, M.S.W. (Atlanta Univ., 1962), Dorothy K. Heyman, M.S.W. (Pennsylvania, 1940), Grace H. Polansky, M.S.W. (Western Reserve, 1949), William D. Sudduth, M.S.W. (Minnesota, 1960), Lily P. Wang, M.S.W. (UNC, 1959).

Instructors: Judith S. Altholz, M.S.W. (Chicago, 1969), Betty P. Busko, M.S.S. (Bryn Mawr, 1971), Patricia D. Hall, M.S.W. (UNC, 1967), Eleanor deG. Heath, M.S.W. (UNC, 1967), Frances M. Martin, M.S.W. (UNC, 1968).

DIVISION OF VETERANS ADMINISTRATION

Associate Professor: Robert L. Green, Jr., M.D. (Hahemann, 1946), *Head*.

Associate Professors: Demmie G. Mayfield, M.D. (Texas, 1958), William W. K. Zung, M.D. (Texas, 1961).

Assistant Professors: W. Edwin Fann, M.D. (Med. Coll. of Alabama, 1959), John A. Gergen, M.D. (Harvard, 1957).

Associates: Jesse O. Cavenar, M.D. (Arkansas, 1963), Robert M. Martin, Jr., M.D. (Emory, 1952), C. Bryan Norton, M.D. (Duke, 1966), David W. Robinson, Jr., M.D. (Michigan, 1962).

Required Courses

PSC-200—required for all medical students during the first year—consists of 60 hours devoted to human behavior. A lecture series introduces the student to the concepts, techniques, and data of the various sciences most relevant to an understanding and multifaceted approach to human behavior. Lecturers from the fields of behavioral neurobiology, psychology, psychiatry, and sociology discuss behavior from the point of view of heredity and constitution, central and autonomic nervous systems, inner emotional conflicts and interpersonal relationships, learning, cognition and perception, and relationships between the individual and his family, social institutions, and his culture and subculture. Functional and developmental points of view are presented and stages in the development of the individual personality are traced. Wherever possible relationships between the various approaches to human behavior are emphasized. Concurrently, a series of small group meetings provide opportunities for additional assimilation of lecture material and its application to specific examples of behavior through interviews of patients and group discussions. The small groups also provide opportunities to introduce effective techniques of human interaction and observation of the primary data on human behavior as well as methods of recording and interpreting these observations. In both the didactic and small group laboratory portions of the course, the relevance of human behavior to the biological and psychosocial aspects of medicine are stressed.

PSC-201—required during the second year—is a seven-week clerkship in clinical psychiatry. The student assumes limited responsibility, under supervision, for diagnosis and treatment of patients on the psychiatric wards, psychiatric out-

patient clinic, and psychosomatic consultation services on non-psychiatric wards of the hospitals. Supervision is directed toward the significant application of concepts of diagnosis, psychopathological formulation, and therapy through descriptive-organic directive and the psychoanalytic-psychosocial-psychotherapeutic contributions to current psychiatric thought. Supervision is also provided to develop interpersonal techniques of sensitive observation and therapeutic use of self. Emphasis is placed upon concepts and techniques applicable to all patients as well as psychiatric patients. Didactic instruction includes seminars on symptomatic, characterological, and psychophysiological neurotic conditions, major psychoses, somatic therapy, and introductory electroencephalography. In addition to rounds and case conferences, students are encouraged to observe psychotherapy and participate in supervised psychotherapeutic treatment whenever appropriate situations can be provided.

Electives

PSC-202(B). Philosophy of Science and Behavioral Sciences. Survey of current theories of knowledge, particularly as they relate to the special complex problems of empirical meaning, objectivity, measurement, and verification in studies of human behavior. Consideration is also given to the mind-body problem. Term: 2. Weight: 1. *Hine*

PSC-203(B). Experimental Design in Behavioral Research. Discussion of research strategies in behavioral and social sciences. Particular emphasis will be upon the analysis and criticism of experimental design as it applies to behavioral research with a focus upon the validity of research findings and their generalizability. Term: 3. Weight: 1. *Carson*

PSC-213(B). Human Development I: Birth-Adolescence. A survey of psychological development from birth to adolescence in terms of sequential emergence of major behavioral systems. Terms: 1 or 3. Weight: 2. *Borstelmann and Clifford*

PSC-214(B). Human Development II: The Later Years of Life. A review of selected biological, psychological, and social aspects of development at the end of the life cycle. Terms: 2 or 4. Weight: 2. *Maddox and Busse*

PSC-215(B). Comparative Personality Theory. An examination of models of human functioning from Freud to the present. Topics will include examples from psychoanalytic, interpersonal, field theoretical, and behavioristic approaches. Term: 3. Weight: 1. *Crovitz and Krugman*

PSC-216(B). Intelligence and Cognition. Description of role of intelligence and cognition in behavior. Theories of intellectual functioning. Introduction to measurement of abilities. Effects of genetics, experience, age and illness upon intelligence. Term: 4. Weight: 2. *Psychiatry Staff*

PSC-221(B). Introduction to Biological Correlates of Behavior. The course is a selective presentation of current concepts of the biological determinants of behavior. An introduction to autonomic nervous system conditioning and psychophysiological methods is included. (Also listed as PHS-221B.) Term: summer. Weight: 1. *Friedel and Staff*

PSC-223(B). Biological Correlates of Behavior. A survey of current concepts of genetic, anatomical, physiological, neurochemical and pharmacological factors affecting perception, cognition, feeling states, states of awareness and memory is presented. The course includes an analysis of autonomic nervous system conditioning and an introduction to psychophysiological methods. The course also involves laboratory demonstrations, experiments and discussions of principles presented in lectures. (Also listed as PHS-223B.) Terms: 1 and 2. Weight: 4. *Friedel and Staff*

***PSC-238(B). The Electroencephalogram and Psychological Function.** A survey of the literature on brain wave correlates of intelligence, personality, behavior disorders, epilepsy, sleep, sensory stimulation, conditioning, and learning. Lectures and laboratory demonstrations are included. (Also listed as Psychology 238 in the *Graduate School Bulletin*.) Terms: 3 and 4. Weight: 3. *Obrist*

PSC-293(B). Learning Theory and Psychopathology. An understanding of learning theory as applied to human behavior and its normal and pathologic aspects. Term: 3. Weight: 2. *Gentry*

PSC-299(B). Preceptorship in Behavioral Science. Opportunity for the student to work closely with a member of the faculty in an area of mutual interest with emphasis upon research. Every term. Weight: 1 to 8. *Eisdorfer, Friedel, and Staff*

PSC-303(B). Mental Retardation. A consideration of early child development from the psychological point of view, focusing on mental retardation. Implications for medical practice, education, research, and program development. Terms: 1, 2, or 3. Weight: 2. *Headrick*

PSC-305(B). Social and Cultural Aspects of Illness. Seminar on medical-social roles in community and hospital. Topics include physician-patient relationship; epidemiology of illness and health services in terms of ecology, social stratification, race, life cycle. Students wishing further work in one particular topic, such as Negro sub-culture or gerontology, should take PSY-299(B) specifying particular interest. May be taken in conjunction with PSC-230(C), PSC-251(C). Term: 3. Weight: 3. *Maddox, Palmore, and Jackson*

PSC-367(B). Philosophical, Social, and Psychological Conceptions of Alienation. Seminars oriented to a discussion of the readings in philosophy (primarily terms 1-2) and psychology (primarily terms 3-4) with the ultimate aim of assessing the nature, extent, and importance of "alienation" of modern man with his environment and with himself. Terms: 1, 2, 3, or 4. Weight: 1. *Ellinwood and Eisdorfer with assistance from Departments of Philosophy, English, Theology, Sociology, Psychiatry*

PSC-227(C). Behavioral Aspects of Pediatric Illness. The purpose of this course is to introduce the student to the emotional aspects of sick children. Experience will include the impact on the family as well as the psychic and somatic adjustments of the child. (See also PED-227C.) Every term. Weight: 3. *Jones, Stevenson, Perry, and Driscoll*

PSC-230(C). Clinical Research Preceptorship in Community Psychiatry.

The course will focus upon the evaluation of such community mental health problems as alcoholism and suicide and mental illness and the clinical techniques used to correct these conditions. Students will be assigned to one of the staff for their field experience. Every term. Weight: 3. *Eisdorfer, Maddox, Fowler, Lowenbach, Shows, and Giragos*

PSC-234(C). Clinical and Experimental Psychopharmacology.

Experience in one or more areas of psychopharmacology including clinical use of drugs, human experimental psychopharmacology and animal neuropharmacology. Lectures covering mechanisms of action and clinical use of psychoactive drugs. Terms: 2 or 3. Weight: 3. *Mayfield, Ellinwood, and Wilson*

PSC-240(C). Inpatient Psychiatry: Environmental and Somatic Therapy

(A). Intensive clinical course—diagnosis, treatment, and management methods. Patient care responsibilities including management of ward milieu and experience with somatic, individual, and group psychotherapy. Student given more clinical responsibility than in sophomore year. If desired, may arrange for special reading tutorial in related topics, (e.g., schizophrenia). Every term. Weight: 8. *Green and Hine*

PSC-241(C). Inpatient Psychiatry: Environmental and Somatic Therapy

(B). Less individual patient responsibility than PSC-240(C). Diagnosis, psychodynamics, and treatment emphasized. Student given more clinical responsibility than in sophomore year. If desired may arrange for special reading tutorial in related topics, (e.g., schizophrenia). Every term. Weight: 6. *Green and Hine*

PSC-242(C). Inpatient Psychiatry: Environmental and Somatic Therapy

(C). Selected patient conferences and didactic lectures. Student is given more clinical responsibility than in sophomore year. If desired, student may arrange for special reading tutorial in related topics, (e.g., schizophrenia). Every term. Weight: 3. *Green and Hine*

PSC-243(C). Principles and Practice of Outpatient Psychiatry.

Training and experience in recognizing and treating emotional disorders in outpatients. Supervised experience with patients having emotional problems commonly seen in medical practice. Training to include theory and techniques of brief psychotherapy, crisis intervention, supportive psychotherapy, and utilization of community resources, both at Duke Hospital and neighboring agencies. Every term. Weight: 3 to 8. *Fowler, Llewellyn, Rockwell, and Giragos*

PSC-245(C). Psychosomatic Medicine and Liaison Psychiatry.

Consultations are carried out on inpatients and other services. Treatment may be offered as recommended. Small group patient care conferences are held with specialized groups in the hospital. This may be taken in conjunction with courses PSC-289(B) and PSC-301(B). Terms: 1, 2, 3, or 4. Weight: 3 to 8. *Reckless, Breslin, and Staff*

PSC-251(C). Community Psychiatry and Mental Health.

The student will be assigned to a faculty member active in Community Mental Health consistent with the student's special interests such as, Agency Consultation, Sociological Studies, Community Health Center Operations, Student Mental Health, Suicide and

Crisis Intervention, etc.; and his faculty instructor will work out a laboratory project and special areas of study. Terms: 1, 2, 3, or 4. Weight: 4 to 8. *Llewellyn, Eisdorfer, Maddox, Rockwell, Giragos, Fowler, and Lowenbach*

PSC-253(C). Group Psychotherapy. Observation of an on-going outpatient group psychotherapy program. Every term. Weight: 2 to 3. *Norton and Staff*

PSC-255(C). Marriage Counselling in Medical Practice. The principles and practices of marriage counselling will be taught. Required reading assignments will be made. The non-medical resources of marriage counselling will also be presented. Sexual problems commonly occurring in marriage will be discussed. Terms: 2 or 3. Weight: 1. *Llewellyn, Breslin, and Pfeiffer*

PSC-259(C). Clinical Neurophysiology (EEG). Didactic and tutorial training in clinical neurophysiology as it relates to diseases of the central nervous system. The technical and interpretative aspects of electroencephalography are taught. Every term. Weight: 3. *Wilson*

PSC-261(C). Practice of Psychological Assessment Techniques. Demonstrations and practice in the administration and in interpretation of psychological assessment techniques with emphasis on the potential utility of these techniques to physicians. Terms: 1, 2, 3, or 4. Weight: 1. *Huse and Staff*

PSC-267(C). Clinical Child Psychiatry. Survey of child and adolescent psychopathology including diagnostic treatment and consultative approaches. Conferences and seminars augment closely supervised clinical experiences. Terms: 1, 2, 3, or 4; or 1 and 2 or 3 and 4. Weight: 3 to 6. *Anderson*

PSC-315(C). Pathology of Perception and Thinking. The clinical disorders of perception and thinking will be presented. The neurological, psychiatric, psychological and psychophysiological examinations that best elicit these disorders will be demonstrated. Concepts from neurology, psychiatry, and psychology will be compared and integrated. Term: 3. Weight: 2. *Ellinwood and Thompson*

PSC-327(C). Lectures in Clinical Psychopharmacology. The animal behavioral, human experimental, neurophysiological, and biochemical mechanisms of action and the clinical use of psychoactive drugs. This course will cover the ataractic, hypnotic, stimulant, anti-depressant, and hallucinogenic groups of drugs. Terms: 2 or 3. Weight: 1. *Mayfield and Ellinwood*

PSC-333(C). Psychiatry Theory and Practice and Therapeutic Community in a Private Psychiatric Hospital. Principles and practice of psychiatric diagnosis and treatment. Instruction in psychiatric interviewing techniques. Psychological testing theory and administration. Theory of and supervised experience in individual psychotherapy, group psychotherapy, psychodrama, occupational therapy, recreational therapy, and total management of the patient. Board and lodging for single and married students furnished. Every term. Weight: 9. *Neville, Bonner, Gillespie, Green, Huffman, and Johnson*

PSC-335(C). Research Preceptorship in Clinical Psychiatry. This course allows the student to work on a research project in clinical psychiatry with selected

members of the psychiatric staff. Terms: 1, 2, 3, or 4. Weight: 3 to 8. *Clinical Staff*

PSC-337(C). Geriatric Psychiatry. The medical and clinical aspects of geriatric psychiatry with emphasis on diagnosis and management of geriatric patients in a variety of treatment facilities. Course includes attendance at scheduled conferences and supervised review of geriatric literature. Course may be taken in conjunction with PSC-214(B), Personality Development II-Adolescence and Old Age. Terms: 1, 2, 3, or 4. Weight: 3 to 8. *Peak, Verwoerd, Wang, Palmore, and Staff*

PSC-339(C). Preceptorships in Clinical Psychiatry. An advanced training program in the preceptorship style for the recognition, diagnosis, prognosis and treatment of psychiatric disorders. Experience will be mainly with inpatients and patients seen in consultation from other services but may include outpatients as well. Terms: 1, 2, 3, or 4. Weight: 3 to 8. *Clinical Staff*

PSC-343(C). Theoretical and Practical Aspects of Alcohol and Drug Abuse. The personality and sociocultural aspects of the drug and alcohol abuser are considered in depth. A student is taught the neuropharmacology of drug and alcohol abuse and is instructed in laboratory and research techniques with this population. He is offered a chance to engage in treatment of the abuses. Terms: 3 or 4. Weight: 6 to 8. *Ellinwood, Mayfield, Maddox, and Rockwell*

PSC-351(C). Clinical Use of Computers in Psychiatry. The course will re-familiarize with Fortran, the use of the IBM 1130, the use of the IBM, Conversational Programming System, and the Psychiatric Information Network. Terms: 2 or 3. Weight: 8. *Gianturco and Ramm*

PSC-353(C). Prison Psychiatry—Adult and Adolescent. Part-time or full-time work in a prison setting is offered. Diagnosis and treatment of adult and adolescent offenders with a variety of mental and physical illnesses and behavioral disturbances are emphasized. Elements of forensic psychiatry are stressed where appropriate. Supervision is provided by Duke and UNC consultants and the Central Prison Hospital and Mental Health Staff. Opportunities for participation in a wide range of original and on-going research are available. Every term. Weight: 9 or less. *Gallemore, Smith, and Meltzer*

PSC-355(C). Clinical Experience in Psychotherapy. A student who undertakes the psychotherapy of a psychiatric patient may obtain credit for this experience provided he can obtain the services of a psychiatric faculty member to serve as supervisor for this experience. The arrangement should be confirmed with the fourth year clinical D. P. A. Every term. Weight: 1 to 3. *Psychiatric Staff*

PSC-357(C). Behavior Therapy Seminar. This experience is offered as a continuum throughout the whole academic year. It will consist of a review of pertinent literature, a discussion of cases currently under treatment by members of the psychiatric department as well as organized reading. Supervision will be offered in a case undertaken by the trainee. This course may be only taken in its entirety from the period September through May of the academic year. It may be taken in conjunction with PSC-293(B). Terms: 1, 2, 3, or 4. Weight: 1 to 2. *Rhoads*

PSC-361(C). Clinical Seminar. Approach to diagnosis and treatment of psychiatric disorders. Term: 2. Weight: 1 to 3. *Lowenbach*

PSC-363(C). Group and Personal Dynamics. A weekly seminar allowing the student to function as a participant in a group utilizing sensitivity and encounter group techniques. The student will learn in an experiential setting principles of group dynamics and gain insight into the nature and meaning of his interactions with others. Optional assigned outside reading. Terms: 1 and 2 or 3 and 4. Weight: 1 to 3. *Norton and Hawkins*

PSC-365(C). Individual Psychotherapy Based on Psychoanalytic Theory. Seminar concerning the theory and practice of individual psychotherapy involving reading, lecture, and discussion. If possible, on-going discussion of student's cases will be utilized. Students will be encouraged to become involved in therapeutic work with an individual case. Terms: 1 and 2; 3 and 4. Weight: 1 to 2. *Pauk*

Radiology

Professor: Richard G. Lester, M.D. (Columbia, 1948), *Chairman*.

DIVISION OF DIAGNOSTIC RADIOLOGY

Professors: Richard G. Lester, M.D. (Columbia, 1948), George J. Baylin, M.D. (Duke), 1937), William F. Barry, Jr., M.D. (Pennsylvania, 1946).

Associate Professors: James T. T. Chen, M.D. (National Defense Medical Center, 1950), John A. Goree, M.D. (Duke, 1955), Herman Grossman, M.D. (Columbia, 1953), John P. Jimenez, M.D. (Med. Coll. of Virginia, 1955), Irwin S. Johnsrude, M.D. (Univ. of Manitoba, 1956), Reed P. Rice, M.D. (Indiana, 1955), *Director*.

Assistant Professors: John A. Gehweiler, M.D. (Duke, 1956), James D. Green, M.D. (Tulane, 1964), Arvin E. Robinson, M.D. (Med. Coll. of Virginia, 1964), James K. Sexton, M.D. (Bowman Gray, 1957), Thomas T. Thompson, M.D. (Med. Coll. of Virginia, 1964).

Associates: David L. Grode, M.D. (Duke, 1967), Salutaris J. R. Martinez, M.D. (Havana, 1961), George M. McCord, Jr., M.D. (Emory, 1965), Jerko Poklepovic, M.D. (Zagreb, 1965), Larry K. Totten, M.D. (Duke, 1964).

DIVISION OF RADIATION THERAPY

Professor: Patrick J. Cavanaugh, M.D. (St. Louis, 1951), *Director*.

Professor: John C. Evans, M.D. (Michigan, 1948).

Associate Professor: Boyd T. Worde, M.D. (Tennessee, 1947).

Assistant Professors: Norman Abramson, M.D. (Temple, 1962), Raymond U. Ph.D. (Kyoto Univ., Kyoto, Japan, 1970).

DIVISION OF NUCLEAR MEDICINE

Professor: Jack K. Goodrich, M.D. (Tennessee, 1953), *Director*.

Associate Professors: Jack D. Davidson, M.D. (Columbia, 1943), Joseph P. Workman, M.D. (Maryland, 1946).

Assistant Professors: William H. Briner, B.S. (Temple, 1954), Craig C. Harris, M.S. (Tennessee, 1951), Robert H. Wilkinson, Jr., M.D. (Washington Univ., 1958).

Associates: Mohammed R. Habibian, M.D. (Univ. of Tehran, 1960), Raleigh F. Johnson, Jr., Ph.D. (Purdue, 1969).

DIVISION OF RADIATION PHYSICS

Professor: Fearghus O'Foghludha, Ph.D. (Nat'l. Univ. of Ireland, 1961), *Director*.

Assistant Professor: Alice McCrea, M.D. (Chicago, 1956).

DIVISION OF RADIOBIOLOGY

Professor: Aaron P. Sanders, Ph.D. (UNC, 1964), *Director*.

Assistant Professor: William D. Currie, Ph.D. (UNC, 1964).

Associate: Gale B. Hill, Ph.D. (Duke, 1966).

DIVISION OF RADIOLOGIC TECHNOLOGY

Assistant Professor: John B. Cahoon, R.T. (Duke, 1939), *Director*.

Associate Clinical Professor: O. Doyle, M.D. (Yale, 1947).

Assistant Clinical Professor: Robert E. McLelland, M.D. (Cincinnati, 1948).

RADIATION SAFETY

Associate: Conrad Knight, B.S. (Norwich, 1953).

Required Course

RAD-200—the basic course in radiology for all medical students—is given during the second year. The course consists of weekly two hour lecture-demonstrations presented by members of the radiology senior staff to provide a broad exposure to the entire field of radiology including diagnostic radiology, therapeutic radiology, and nuclear medicine. Although the course consists chiefly of an introduction to the specialty of radiology, the fundamentals of chest radiography are particularly emphasized.

Electives

RAD-227(B). General Radiobiology. Basic fundamentals essential to an understanding of biological effects of ionizing radiation. Major sections include radiation physics, radiation dosimetry, target theory and activated water theory in radiation damage, oxygen effect, radiobiochemistry, subcellular effects, tissue radiosensitivity, general radiation syndrome. Term: 3. Weight: 2. *Sanders, Currie, Hill, and Evans*

RAD-207(C). Pediatric Radiology. A specialized program of instruction and participation in the wide variety of radiographic examinations in the pediatric age group. Special correlation of these examinations to the problems of specific diagnosis and patient care will be made. Student is to meet with D. P. A. prior to registering for any of the clinical electives in radiology. Terms: 1, 2, 3, or 4. Weight: 4. *Grossman and Robinson*

RAD-209(C). Clerkship in Neuroradiology. A specialized program of detailed instruction in Neuroradiology. The program includes participation in the performance and interpretation of a variety of examinations including carotid arteriography, retrograde brachial arteriography, pneumoencephalography, myelography and others. Student is to meet with D. P. A. prior to registering for any of the clinical electives in radiology. Terms: 1, 2, 3, or 4. Weight: 4. *Goree, Jimenez, and Staff*

RAD-215(C). Clinical Radiation Therapy. Approximately two-thirds of new cancer patients seen at the Medical Center are concentrated within the Division of Radiation Therapy. The course mainly provides an opportunity to observe a wide spectrum of clinical behavior in new patients, follow-up clinic, and in cases undergoing treatment. The course is aimed particularly at students leaning

toward gynecology, otolaryngology as well as general surgery. Student is to meet with D. P. A. prior to registering for any of the clinical electives in radiology. Every term. Weight: 4 to 8. *Cavanaugh, Worde, Evans, Abramson, and McCrea*

RAD-229(C). Basic Radiology Clerkship. This clerkship provides a full or part-time exposure to general radiology, including radiation therapy. Students are given preferences in selection of subspecialty assignments but emphasis is on a broad view of the specialty of radiology. Part-time courses can be arranged to fit other schedules. Student is to meet with the D. P. A. prior to registering for any of the clinical electives in radiology. Terms: 1, 2, 3, or 4. Weight: 4 to 8. *Lester and Staff*

Surgery

James B. Duke Professor: David C. Sabiston, Jr., M.D. (Johns Hopkins, 1947), *Chairman*.

DIVISION OF GENERAL AND THORACIC SURGERY

Professors: William W. Shingleton, M.D. (Bowman Gray, 1943), *Chief of Division of General Surgery*; Will C. Sealy, M.D. (Emory, 1936), *Chief of Division of Thoracic Surgery*.

Professors: D. Bernard Amos, M.D. (Guys Hospital, London, 1963), *Experimental Surgery*; William G. Anlyan, M.D. (Yale, 1949); Eugene D. Day, Ph.D. (Delaware, 1952), *Experimental Surgery*; Keith S. Grimson, M.D. (Rush, 1933); Norman Kirshner, Ph.D. (Pennsylvania, 1952), *Experimental Surgery*; William P. J. Peete, M.D. (Harvard, 1947); Raymond W. Postlethwait, M.D. (Duke, 1937), *Chief of Surgery, V.A. Hospital, Durham*; Delford L. Stickel, M.D. (Duke, 1953), *Chief of Staff, V.A. Hospital, Durham*; W. Glenn Young, Jr., M.D. (Duke, 1948).

Associate Professors: Robert A. Bonar, Ph.D. (California, 1953), *Biophysics*; Brian A. Hills, Ph.D. (Adelaide, England, 1966), *Experimental Surgery and Biomedical Engineering*; R. Scott Jones, M.D. (Texas, 1961); Norman F. Ross, D.D.S. (Temple, 1937), *Dentistry*; Hilliard F. Seigler, M.D. (UNC, 1960); Donald Silver, M.D. (Duke, 1955).

Associate Clinical Professors: James E. Davis, M.D. (Pennsylvania, 1943); William F. Hollister, M.D. (Duke, 1939); Timothy Takaro, M.D. (N.Y.U. Medical Coll., 1943).

Assistant Professors: Dani P. Bolognesi, Ph.D. (Duke, 1964), *Experimental Surgery*; Perr-Otto F. Hagen, B.Sc. (Watt Univ., Edinburgh, Scotland, 1958), *Experimental Surgery*; H. Newland Oldham, Jr., M.D. (Baylor, 1961); F. M. Simmons Patterson, M.D. (Pennsylvania, 1939); Frances E. Ward, Ph.D. (Brown, 1965), *Experimental Surgery*; Samuel A. Wells, Jr., M.D. (Emory, 1961).

Assistant Clinical Professors: Robert W. Love, Jr., M.D. (St. Louis Univ., 1954); Lockert B. Mason, M.D. (Med. Coll. of Virginia, 1945); H. Max Schiebel, M.D. (Johns Hopkins, 1933); Stewart M. Scott, M.D. (Baylor, 1951); Douglas H. Stone, M.D. (Harvard, 1937).

Associates: Dorothy W. Beard, R.N. (Vanderbilt, 1929), *Experimental Surgery*; Ralph E. Snider, D.D.S. (Ohio State, 1948), *Dentistry*.

Clinical Associates: John C. Kouns, D.D.S. (Emory, 1937), *Dentistry*; Nathan Schupper, D.D.S. (Pittsburgh, 1932), *Dentistry*; E. Wilson Staub, M.D. (Northwestern, 1957).

Clinical Instructors: Albert H. Bridgman, M.D.; Gordon M. Carver, Jr., M.D.; Hugo L. Deaton, M.D.

Research Associates: Ruth Georgiade, M.A.; Ryotaro Ishizaki, Ph.D.; Alphonse J. Langlois, Ph.D.; Marguerite Alberta Thiele, A.B.

DIVISION OF NEUROSURGERY

Professor: Guy L. Odom, M.D. (Tulane, 1933), *Chief*.

James B. Duke Professor: Barnes Woodhall, M.D. (Johns Hopkins, 1930).

Associate Professor: Blaine S. Nashold, M.D. (Louisville, 1949).

Assistant Professors: Wesley A. Cook, Jr., M.D. (Oregon, 1963); M. Stephen Mahaley, M.D. (Duke, 1959), Ph.D. (Duke, 1959); Robert H. Wilkins, M.D. (Pittsburgh, 1959).

DIVISION OF ORAL SURGERY

Professor: Nicholas G. Georgiade, D.D.S., M.D. (Duke, 1949), *Chief*.

Clinical Instructors: Claude J. Hearn, D.D.S.; Glenn A. Lazenby, D.D.S.; Jere E. Roe, D.D.S.

DIVISION OF ORTHOPAEDIC SURGERY

Professor: J. Leonard Goldner, M.D. (Nebraska, 1943), *Chief*.

Professors: Lenox D. Baker, M.D. (Duke, 1934); Frank W. Clippinger, M.D. (Washington Univ., 1952); Donald E. McCollum, M.D. (Bowman Gray, 1953).

Associate Professor: Frank H. Bassett, III, M.D. (Louisville, 1957).

Associate Clinical Professor: Everett I. Bugg, Jr., M.D. (Johns Hopkins, 1937).

Assistant Professors: Benjamin L. Allen, M.D. (Duke, 1964); James R. Urbaniak, M.D. (Duke, 1962).

Assistant Clinical Professors: John Glasson, M.D. (Cornell, 1943); C. Robert Lincoln, M.D. (Med. Coll. of Virginia, 1960); Howard A. Wright, M.D. (N.Y.U. Coll. of Med., 1943).

Clinical Associates: Ralph W. Coonrad, M.D. (Duke, 1947); Shankar N. Kapoor, M.D. (King George's Med. Coll., Lucknow, India, 1935); Glendall L. King, M.D. (Washington Univ., 1955), Ph.D. (Illinois, 1949).

Clinical Instructor: William J. Callison, M.D.

Clinical Lecturers: Delos W. Boyer, M.D.; Leslie C. Meyer, M.D.; George R. Miller, M.D.; Robert E. Musgrave, M.D.; William McK. Roberts, M.D.; Frank H. Stellings, M.D.

DIVISION OF OTOLARYNGOLOGY

Professor: William R. Hudson, M.D. (Bowman Gray, 1951), *Chief*.

Associate Professor: Patrick D. Kenan, M.D. (Duke, 1959), *Assistant to the Vice President for Health Affairs for Community Affairs*.

Assistant Professors: T. Boyce Cole, M.D. (UNC, 1962); Joseph C. Farmer, Jr., M.D. (Duke, 1962).

Assistant Clinical Professors: George B. Ferguson, M.D. (Jefferson, 1932); Carl M. Patterson, M.D. (Maryland, 1944).

Associates: Burton B. King, M.A. (Northwestern, 1955); Robert G. Paul, Ph.D. (Oklahoma, 1969).

Clinical Associate: Thaddeus H. Pope, Jr., M.D. (UNC, 1957).

Instructors: Nicki M. Mulford, M.A., Susan M. Stewart, M.A.

Clinical Instructors: Seth G. Hobart, Jr., M.D.; William B. Inabnet, M.D.

DIVISION OF PLASTIC AND MAXILLOFACIAL SURGERY

Professor: Kenneth L. Pickrell, M.D. (Johns Hopkins, 1935), *Chief*.

Professors: Nicholas G. Georgiade, D.D.S., M.D. (Duke, 1949); Galen W. Quinn, D.D.S. (Creighton, 1952), Orthodontics.

Associate Professors: Edward Clifford, Ph.D. (Minnesota, 1954); Raymond Massengill, Jr., Ed.D. (Virginia, 1968), Speech Pathology.

Assistant Professors: Andrew P. Collins, M.S.D. (Washington, 1969), Orthodontics; Lawrence K. Thompson, III, M.D. (Duke, 1961).

Associate: Laura R. Love, Ph.D. (Texas, 1969), Speech Pathology.

DIVISION OF UROLOGIC SURGERY

Professor: James F. Glenn, M.D. (Duke, 1952), *Chief*.

Professors: John E. Dees, M.D. (Virginia, 1933); James H. Semans, M.D. (Johns Hopkins, 1936).

Associate Professor: E. Everett Anderson, M.D. (Duke, 1958).

Associate Clinical Professor: Louis C. Roberts, M.D. (Duke, 1934).

Assistant Professors: John H. Grimes, M.D. (Northwestern, 1965); David F. Paulson, M.D. (Duke, 1964).

Assistant Clinical Professors: A. James Coppridge, M.D. (Virginia, 1953); Jack Hughes, M.D. (Pennsylvania, 1943).

Required Course

SUR-200—the required course—is given in the second year and consists of a seven-week clinical clerkship for each student, with the primary aim the presentation of those concepts and principles which characterize the discipline of surgery. Basic and objective studies which are the foundation of surgical diagnosis and treatment and clinical documentation are emphasized. These topics are presented in informal seminars three times weekly and include antisepsis and surgical bacteriology, wounds and wound healing, inflammation, fluid and electrolyte balance, shock, the metabolic response to trauma, biology of neoplastic disease, gastrointestinal physiology and its derangements, blood coagulation, thrombosis, and embolism.

The students are divided into small groups and each is assigned a senior surgical instructor. Rounds at the bedside are made three times weekly with the faculty. Each morning students attend clinical rounds with the resident staff for discussion of surgical diagnosis and therapeutics. A one-hour session daily is devoted to a surgical specialty demonstration including conferences in neurosurgery, orthopaedics, otolaryngology, plastic surgery, and urology. Students are assigned patients on the surgical wards for diagnosis and management.

Electives

SUR-201(C). Advanced Surgery—Emphasis Cancer. Advanced concepts in surgery will be presented in seminars, and in ward, clinic, and operating room experiences. Fifty to 75 percent of the time will be devoted to clinical cancer and related basic topics, and the remainder to surgery generally. (Note: Seminars will be the same as in SUR-291. The student, therefore, may elect to take SUR-201 or 291 but not both.) Term: 1. Weight: 2 to 8. *Shingleton and Staff*

SUR-202(C). Advanced Surgery—Emphasis Cardiovascular-Thoracic. Advanced concepts in surgery will be presented in seminars, and in ward, clinic, and operating room experiences. Fifty to 75 percent of the time will be devoted to cardiovascular-thoracic surgery and related basic topics, and the remainder to surgery generally. Term: 2. Weight: 8; 2 for seminars only. *Sabiston, Dillon, Grimson, Oldham, Sealy, Silver, and Young.*

SUR-203(C). Advanced Surgery—Emphasis Transplantation. Advanced concepts in surgery will be presented in seminars, and in ward, clinics, and operating room experiences. Fifty to 75 percent of the time will be devoted to clinical transplantation and related basic topics, and the remainder to surgery generally. Term: 3. Weight: 8; 2 for seminars only. *Stickel, Seigler, Amos, and Staff*

SUR-204(C). Advanced Surgery—Emphasis Gastrointestinal and Trauma (Patient Care). Advanced concepts in surgery will be presented in seminars, and in ward, clinic, and operating room experiences. Fifty to 75 percent of the time will be devoted to surgery of the alimentary tract and trauma and related basic topics, and the remainder to surgery generally. Term: 4. Weight: 8; 2 for seminars only. *Peete, Grimson, Shingleton, Seigler, Thompson, and Clippinger*

SUR-205(C). Advanced Surgery—Emphasis Pediatric Surgery. Advanced concepts in surgery will be presented in seminars, and in ward, pediatric surgical clinic, and operating room experiences. Fifty to 75 percent of the time will be de-

voted to pediatric surgery and related basic topics, and the remainder to surgery generally. Term: Summer. Weight: 8; 2 for seminars only. *Silver and Staff*

SUR-206(C). Surgical Aspects of Thoracic Disorders. The student will be assigned to the Thoracic Service where he will participate in the diagnosis, surgical treatment of patients with pulmonary, esophageal, and cardiac disorders. He will make rounds with the senior and house staff, attend conferences in the department, and meet at intervals with the senior staff concerning special problems in this field. Every term. Weight: 6. *Young and Sealy*

SUR-219(C). Advanced General and Thoracic Surgery (V. A. Hospital). Special attention will be given to those subjects in surgery common to all medical practices. Patients will be assigned to the students. The major emphasis will be on physiologic and pathologic changes, diagnosis, and the indications for operation. Every term. Weight: 8. *Postlethwait, Oldham, Silver, Seigler, and Stickel*

SUR-221(C). Surgical Specialties and Ophthalmology (V. A. Hospital). The student will attend selected conferences of all the surgical specialties and ophthalmology. Additionally he will select two or three of these specialties in which to concentrate experience (on one service at a time) in the operating rooms, clinics, and wards of the V. A. Hospital. Pathophysiology, diagnosis, and treatment will be emphasized. Every term. Weight: 8. *Postlethwait, Chandler, Cole, Dees, Thompson, Urbaniak, and Wilkins*

SUR-222(C). Clinical Dentistry. Normal and abnormal development of head and oral structures. Importance of teeth for mastication, speech, and esthetics. Pediatric to geriatric dental disease, its prevention, examination, diagnosis, and treatment. Surgical correction and clinical management of oral surgical problems. Clinical duty. Every term. Weight: 1. *Quinn, Ross, Collins, and Georgiade*

SUR-223(C). Medical and Surgical Renal Disease. Experience is offered in diagnosis and management of surgical diseases of the urinary tract and medical renal diseases with emphasis on clinical patient care. Participation in special urologic clinics and exposure to hemodialysis is offered with emphasis upon renal transplantation, renal failure, renovascular hypertension, and other aspects of medical and surgical disease. Every term. Weight: 8. *Glenn, Robinson, and respective staffs*

SUR-227(C). Clinical Urologic Survey. The diagnosis, management, and surgical treatment of patients with urologic disorders will be stressed. Students will be afforded intimate association with the entire staff in the clinics, wards, and operating rooms and will participate in surgery. Cystoscopic and urographic diagnostic methods along with other techniques will be taught. Every term. Weight: 8. *Glenn, Dees, Anderson, Grimes, and Staff*

SUR-230(C). Seminar in Urologic Diseases and Techniques. Lecture-seminar course by members of the staff in urology and radiology, providing an introduction to the spectrum of urologic diseases, amplified by demonstration of urologic and radiologic diagnostic methodology. Clinical problems to be stressed include endocrinopathies, pediatric urology, obstructive uropathies, renovascular hypertension, urinary calculi, and urologic malignancies. Informal seminars given weekly. Every term. Weight: 2. *Glenn, Dees, Anderson, Barry, Semans, Grimes, and Staff*

SUR-233(C). Basic Neurosurgery Course. Disease conditions commonly encountered in neurosurgery are presented. Clinical presentation of a common neurological disorder such as brain tumor or head injury is made by a member of the staff. Clinical features and plan of diagnostic investigation are stressed. The clinical disorder is used as a focal point from which to carry the presentation into the basic sciences are related to the clinical problem. Terms: 1, 2, 3, or 4. Weight: 1. *Mahaley, Nashold, and Wilkins*

SUR-235(C). Clinical Neurosurgery. Course is designed for those students with future interest in the neurological sciences. Duties include the workup and care of inpatients, workup of clinic patients, assistants in the operating room, routine post-operative care, daily rounds, and night call. Weekly conferences are held in neurology, neuropathology, and neuroradiology, neurophysiology, and anatomy and special lectures. Every term. Weight: 8. *Odom, Nashold, Mahaley, and Wilkins*

SUR-237(C). Investigative Neurosurgery. The student is assigned a project relating to the neurological sciences and is provided with technical help, recording equipment, and experimental animals necessary for its completion. Each student plans and executes his own individual project, with the help of the neurosurgery staff. Weekly conferences are also attended. Terms: 1, 2, 3, or 4. Weight: 8. *Odom, Nashold, Mahaley, and Wilkins*

SUR-239(C). Clinical Otolaryngology. This course will provide the student with a comprehensive survey of clinical otolaryngology. Duties will include participation in both outpatient clinic activities and inpatient care in addition to assisting in the operating room. The student will participate in ward rounds and in the various conferences held by the division. Every term. Weight: 6. *Hudson, Kenan, Cole, and Farmer*

SUR-240(C). Otolaryngologic Seminar. This conference and demonstration course will provide an introduction to a variety of clinical problems in otolaryngology. Lectures will be supplemented with case presentations illustrating problems encountered in this field. Every term. Weight: 1. *Hudson, Kenan, Cole, and Farmer*

SUR-241(C). Medical Audiology and Speech Pathology. Students will be working in the Hearing and Speech Clinic. Special attention will be given to advanced audiometric techniques including instruction in the use of the Bekesey and PGSR audiometry. Emphasis will also be placed on vestibular mechanisms and testing. The student will also spend some time with the speech pathologist observing methods diagnosis and management of the various speech problems. Contact with clinical otolaryngology will be maintained. Every term. Weight: 5. *King and Massengill*

SUR-245(C). Reconstructive Plastic Surgery. Study of broad principles of trauma, wounding, healing and varied reparative processes. Every term. Weight: 6. *Pickrell, Georgiade, Thompson, and Staff*

SUR-248(C). Investigative and Clinical Approach to Wound Healing, Including Tissue Preservation, Microbiology of Burns. Purpose of this course is to orient students both in the laboratory and on a clinical basis of the various in-

vestigative possibilities giving him the opportunity to work in the plastic surgery research laboratories and correlate the clinical aspects. Every term. Weight: 6. *Georgiade, Pickrell, and Staff*

SUR-254(C). Speech and Hearing Problems in Children with Clefts of the Lip and Palate. Students will have abundant opportunity to learn and work in the Speech and Hearing Laboratory and in the Child Guidance Clinic with children with speech defects. Methods of evaluation, testing, and remedial measures will be studied thoroughly. Terms: 1, 2, 3, 4. Weight: 5. *Massengill, Pickrell, Hudson, and Staffs*

SUR-255(C). Medical Speech Pathology. Diagnostic and rehabilitation treatment used with the patients at Medical Center, including articulation disorders, delayed speech development, cleft palate, stuttering, voice disorders, aphasia, cerebral palsy, language disorders, mental retarded speech, lisping, oral inaccuracy, laryngectomy, and other disorders of speech not falling under one certain category. Every term. Weight: 1. *Massengill*

SUR-257(C). Medical Speech Pathology Applied to Reconstructive Plastic Surgery. Research techniques used by speech pathologist with reconstructive plastic surgery patients having organic speech problems. Emphasis placed on cine-fluorographic investigation and speech results achieved by different surgical procedures. Different speech appliances also reviewed. Organization of speech pathology research programs coordinated with reconstructive surgery departments. Every term. Weight: 1. *Massengill*

SUR-259(C). General Principles of Orthopaedics. A full or part-time experience on the Orthopaedic Service with duties and responsibilities similar to a junior intern. Inpatient care, outpatient examination, and operating room experience are included. Individual or group discussions each day with attending staff. The purpose of the course is to present broad concepts of orthopaedics to students planning general practice, pediatrics, allied surgical specialties, or orthopaedics. Every term. Weight: 8. *Goldner, Baker, Clippinger, McCollum, Bassett, Urbaniak, Allen, and Staff*

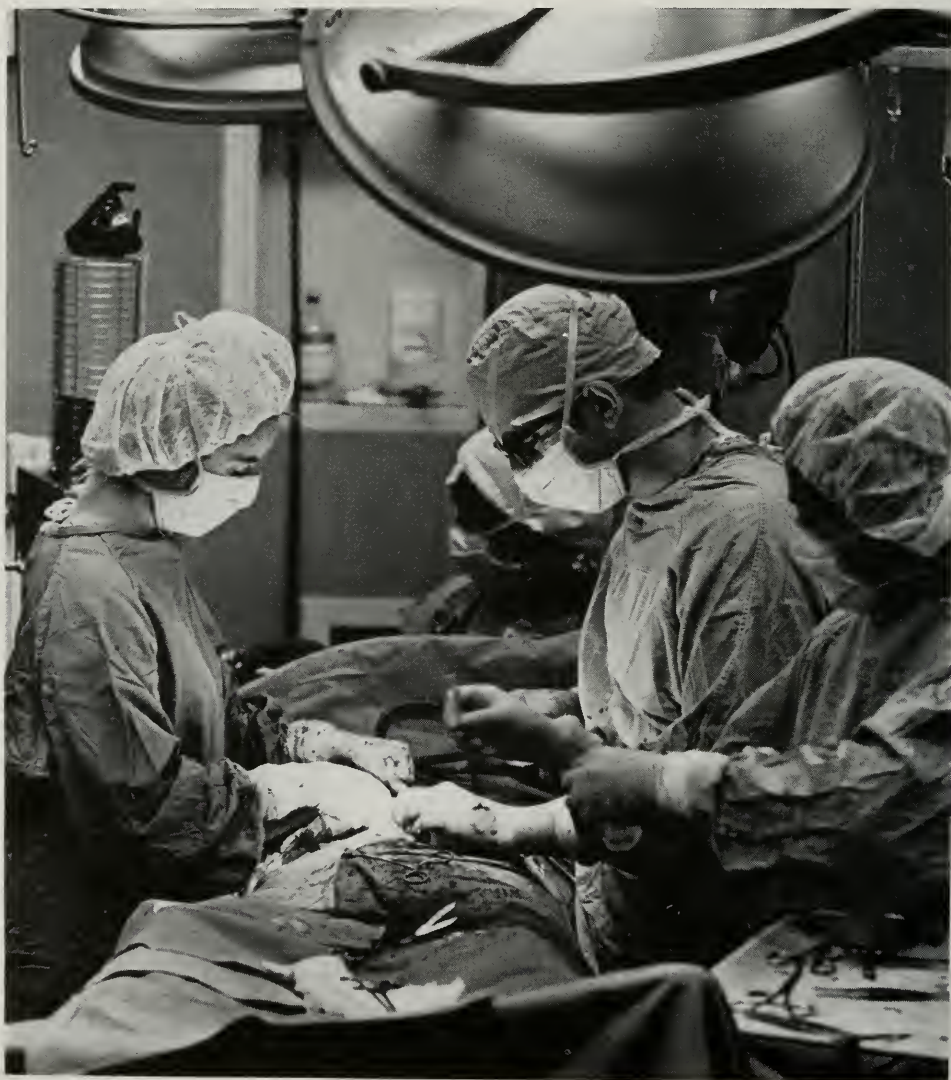
SUR-261(C). Office and Ambulatory Orthopaedics. Introduction to management of patients with complaints referable to the musculoskeletal system. Emphasis on methods of examination and X-ray interpretation. Orientation in record keeping, use of punch cards for diagnosis, office management, and similar details. Students may select individual instructor. Every term. Weight: 8. *Goldner, and all senior staff at Duke, Watts, and Durham V. A. Orthopaedic Services*

SUR-263(C). Orthopaedics in the Community Hospital. Office and hospital practice are emphasized with participating experiences in coordination of private practice, clinic practice, emergency room, and consultation services. The course is conducted in the offices of the Associate Orthopaedists in Durham and in the Community Hospital. Every term. Weight: 8. *Bugg, Glasson, Coonrad, Kapoor, Lincoln, and Staff*

SUR-265(C). Cerebral Palsy and Other Musculoskeletal Abnormalities. The material for this course is available at the North Carolina Cerebral Palsy Hos-

pital and Duke University Medical Center. Students participate in the daily program of diagnosis, treatment, and rehabilitation techniques of the patient with neurological deficits. This includes all aspects of management with experiences in the clinics, and in the operating room. Terms: 1, 2, 3, or 4. Weight: 8. *Goldner and Staff of Orthopaedic Service, Duke and North Carolina Cerebral Palsy Hospitals*

SUR-267(C). Clinical Conference in Cerebral Palsy. Conferences are arranged for those interested in neurological diseases, pediatrics, and related fields. These conferences demonstrate both the individual and group approach to the patient with complex neurologic condition as it affects both growth and development. Outpatients and inpatients are utilized for subject material. Staff personnel readily available for individual seminars. Terms: 1, 2, 3, or 4. Weight: 4. *Coonrad, Renuart, Goldner, Bassett, and North Carolina Cerebral Palsy Hospital Staff*



SUR-269(C). Upper Extremity Surgery and Reconstruction. A general or specific study of conditions affecting the entire upper extremity. The hand may be studied as evidence of systemic disease or from the viewpoint of hand deformities after trauma, congenital defects, or the changes resulting from arthritis. Every term. Weight: 8. *Goldner, Clippinger, McCollum, Bassett, and Staff*

SUR-271(C). Arthritis—Spine and Extremities. Clinical and operating room experience in the management of adult and children's rheumatology. Program coordinated with the Department of Medicine. Rounds, conferences, and clinics are attended at scheduled times. The student has responsibilities of outpatient and inpatient care. Laboratory investigation available if desired. Every term. Weight: 8. *McCollum, Goldner, and Medical Rheumatology Staff*

SUR-273(C). Athletic Medicine—Physical Conditioning and Management of Injuries. The course is directed toward preparing physicians for participating in the athletic aspects of a community school program. The student will learn the general principles of management of trauma, function of the musculoskeletal system, physical conditioning, protective equipment and the care of the athlete. Experience is available with the Duke athletic teams as well as those of the local high schools. Terms: 1, 2, 3, or 4. Weight: 8. *Bassett, Clippinger, and Orthopaedic Staff*

SUR-275(C). Electromyography. This course is an introduction to the theory, techniques and practice of clinical electromyography. Conference and demonstrations are the principle methods of instruction. The student participates in all phases of diagnostic study and learns the indications for use of electromyography as well as the interpretation of data. Every term. Weight: 2. *Clippinger, Urbaniak, and Orthopaedic Staff*

SUR-277(C). Orthopaedic Research. Individual projects are assigned for completion during a limited period of time. A student works with an investigator in the orthopaedic laboratory either at Duke Medical Center or the Durham Veterans Administration Hospital. Clinical investigative studies are also available at both institutions. Every term. Weight: 8. *Goldner, Urbaniak, Allen, Orthopaedic Senior Staff, and House Staff*

SUR-279(C). Orthopaedic Amputee Program—Clinics, Surgery, and Prosthetics. The basic principles of amputation problems are presented in pre-operative indications, principles of surgery, and postoperative inpatient and outpatient care. The multiple problems are presented through weekly amputee clinics. The principles of amputee prosthetics are taught in the Prosthetic Department. The student follows a particular patient through the entire program from amputation to vocational placement. Every term. Weight: 4. *Goldner, Clippinger, Titus, Horton, Physical Therapy Staff, and Duke Prosthetics Department*

SUR-281(C). Introduction to Fractures and Musculoskeletal Trauma. Students will participate in the emergency management of patients through the Duke emergency room primarily, but also through Watts, Lincoln and the Durham V. A. Hospitals. Principles of fractures in trauma will be given throughout the week at specified times and attendance at fracture clinic will be required. Every term. Weight: 3. *Entire Senior Staff at Duke and Watts, supervision by Dr. Goldner at Duke, Dr. Urbaniak at V. A., and Dr. Bugg at Watts*

SUR-283(C). Orthopaedics of Infants, Children, and Adolescents. Orientation of students interested in pediatrics or orthopaedics with emphasis on the basic problems associated with congenital abnormalities and other syndromes of the musculoskeletal system in these age groups. Experience with patients extending from infancy to adolescence is available. The depth of teaching and experience can extend from a few hours a week observation to a full externship. Every term. Weight: 8. *Goldner, Baker, Clippinger, McCollum, Bassett, Stelling, Myer, Miller, Bugg, Coonrad, Glasson, Kapoor, Lincoln, and Musgrave*

SUR-291(C). Cancer: CHS, MED, MIC, OBG, PED, PTH, RAD, and SUR Aspects. Taught by an interdepartmental faculty, course consists of seminars in clinical and related basic aspects of oncology (6 hours a week); case presentation conferences (2 hours a week); and ward and clinic experiences in diagnosis and treatment (remaining time). The student elects one clinical department for the ward and clinic experiences. Terms: 1 and 3. Weight: 2 to 8. *Shingleton, Cavanaugh, Heyden, Johnston, Joklik, Laszlo, and Porter*

SUR-299(C). Advanced Surgical Clerkship. This course is structured to provide the student with a comprehensive approach to surgical disorders. Each student will choose to work in the clinics, on the wards, in the operating rooms and in the laboratory, with one senior surgeon for nine weeks. Advanced concepts in surgery will be taught and problem solving techniques will be demonstrated. Every term at discretion of instructor. (Student should make advanced arrangements with a specific instructor.) Weight: 8. *Sabiston, Dillon, Oldham, Poslethwait, Sealy, Seigler, Shingleton, Silver, Stickel, or Young*

Special Interdisciplinary Training Programs

BSP-201(B). Basic Behavioral Sciences Study Program. The focus of the study program will be to obtain an understanding of basic processes underlying human behavior. This will involve a year long experience designed to familiarize the medical student with significant issues in the behavioral sciences and the methodology used to investigate such issues. It will also include a period of preceptorship in an area of the student's interest. Each student will be given the opportunity to focus on some determinant of human behavior. These may include biological, psychological, developmental, or social factors. The faculty for the BSP is an interdisciplinary group including more than eight departments of the Medical School and University and involving a broad range of interests in individual and group behavior. Every term. Weight: 9 per 9 weeks. *Program Director—Eisdorfer; Associate Directors—Friedel and Maddox*

CVS-201(B). Cardiovascular-Respiratory Sciences Study Program. The Study Program in Cardiovascular-Respiratory Sciences (CVS) is designed to offer third year students instruction for one academic year in basic sciences as applied to the understanding of the cardiovascular and respiratory systems in health and disease. The program is interdepartmental in nature and will constitute a full credit load for those students who participate. It is comprised of three parts that run concurrently.

1. Individual Tutorial. The student will identify with a senior member of the Medical School faculty who is participating in the program. The major part of the educational program for the student will be in the form of individual tutorials

with this member of the staff. This tutorial may be full-time independent research or an intensive study experience for the student. The student and his tutor will develop a plan and will review it with the directors of the program.

2. Group Seminar. A seminar series will be developed, the purpose of which is to read and discuss selected papers and/or discuss problems and topics which arise in the course of the lectures or are complementary to them. Students will be active participants in the seminar, and through this mechanism it is hoped to integrate knowledge of cellular physiology and pharmacology into an understanding of organ system function and control.

3. Lecture Courses. The following courses are required: The Heart (207) and Peripheral Circulation (205) and the Respiratory System (208) in health and disease. These courses in cardiovascular and respiratory physiology and pharmacology will present selected topics in cardiovascular and respiratory physiology and pharmacology including analysis and evaluation of experimental and clinical studies relating to selected diseases of the circulation, cardiac electrophysiology and arrhythmias, ventricular-atrial function, congenital disordered function and coronary blood flow, pulmonary mechanics, central and peripheral regulation of ventilation, pulmonary circulation and respiratory responses to exercise, altitude and hyperbaric environments. The above plan provides a structured and recommended curriculum design. Within this framework multiple pathways are available because of the concentration of effort in the tutorial experience. Tutorials can be arranged within any of the basic science departments or with individuals in clinical departments whose orientation or research is consistent with the goals of the program. Once a tutor is identified, added flexibility is gained by having the option to elect courses in addition to the required course in physiology and pharmacology, or to elect seminars in addition to the group seminar. Terms: 1, 2, 3, and 4. Weight: 9 per 9 weeks. *Boineau, Greenfield, Johnson, Jewett, McHale, Spach, Wallace, Renkin, Mills, Kylstra, Salzano, and Saltzman*

DDS-201(B). Development and Differentiation Study Program. This program is designed to give the medical student an appreciation of developmental phenomena as a basis for advanced training and research in a variety of biomedical disciplines. The multidisciplinary program will emphasize the molecular, biochemical, cellular, and genetic approaches to the analysis of differentiation and development in order to understand fundamental cellular and multicellular phenomena, to provide the student with a firm foundation in the molecular basis of medicine. Emphasis will be on recent concepts in fetal, neonatal, and oncogenic mechanisms as well as processes involved in ageing and cell death. The rapidly expanding body of knowledge gained from these approaches will be examined by the students through seminars and direct observation in the laboratories of the participating faculty.

The program can be selected by the student for one or two semesters. The first semester will consist of (1) a series of lectures given three times a week to cover basic principles, (2) a series of seminars conducted by the students under the guidance of the faculty, and (3) rotation through the laboratories of the participating faculty. During this rotation the student will learn through direct observation, participation, and discussion with the staff of each laboratory. He also may undertake research in one of these laboratories if he so desires.

The students will meet on Monday, Wednesday, and Friday at 9:00-9:50 to attend the introductory course in development and differentiation. This course covers basic principles and is taught by the entire faculty for the purpose of estab-

lishing a firm foundation for the more advanced studies to be given in the second semester.

The students will also prepare and attend seminars in differentiation and development. These seminars will be conducted by the students under the guidance of the faculty and will meet Tuesday evenings. The evening is selected in order to provide the maximum free time for the students during the day for other activities.

The students will also have 10 to 12 weeks of laboratory rotation. This laboratory rotation will be through the laboratories of the participating faculty. This experience will occupy 3 to 5 hours per week and will consist of a series of laboratory experiments to learn through direct observation, participation and discussion with a staff of each laboratory. The experiments are carefully selected to provide an opportunity for the student to become familiar with specific laboratory techniques such as ultracentrifugation, amino acid analysis, electrophoresis, etc. Most important, however, the student will have an opportunity not only to learn experimental design but also to familiarize himself with unique sources of materials for study; for example, *Euglena*, sea urchin, *xenopus laevis*, slime mold, bacteria, bacteriophage, *neurospora*, etc. In addition, this laboratory experience during the rotation will aid in the decision of the area of research and laboratory in which the student will participate during the second semester.

Upon entrance into the program the student will be interviewed by the faculty and his past record examined for any obvious deficiencies. Thus, in addition to the introductory course required of all students, some students may take one or two additional courses as for example, *Macromolecules* or *Enzyme Mechanisms*. The student will not be encouraged to take a large series of courses but will be encouraged to pursue a tutorial experience. In some cases the students, for example, may start their research tutorial in November, while others may defer this decision to a later date. In a few cases, the students may also elect to spend part of their time in a library project under close faculty supervision. If the student elects to do a library project he will prepare this work to be circulated among the faculty and will present an in-depth seminar. The mornings will be reserved for course work and the afternoons for laboratory rotation and tutorials.

In the second semester, the students may wish to apply the knowledge gained in the first semester directly to advanced training or research in a field of study of his interest such as teratogenesis, immunology, hematology, cardiology, endocrinology, etc. In this event, he would be permitted to elect appropriate course as a study program or research in these areas. The formal developmental biology course will be finished in the first semester, but the seminar course will continue through the second semester meeting two hours per week on Tuesday and Thursday.

The course work for the second semester will consist of advanced courses, for example, the *Biochemistry of Development*, *Animal Cell Virology*, and *Endocrinology and Reproduction*. The student will select a preceptor in whose laboratory and under whose guidance he will engage in a research project.

The student is offered considerable flexibility in this program, since he need not commit himself to it prior to this choice of preceptor. But by taking 18 hours of course work during the first semester, he is not penalized if he decides not to continue this program during the second semester. Terms: 1 and 2 required; 3 and 4 optional. Weight: 18 per semester. *McCarty, Counce, Luftig, Padilla, Harris, Sommer, Moses, and Kaufman*

EDR-201(B). Endocrinology and Reproductive Biology Study Program.

This is an interdepartmental program designed to provide third-year medical students with an opportunity for intensive study in areas of basic endocrinology, neuroendocrinology, and reproductive biology as they relate to the function of the endocrine and reproductive systems in normal and disease states. Major emphasis in the program is placed on development of a plan of independent study appropriate to the aims of each student based on a tutorial or preceptorship with an individual member of the program faculty. In addition, all members of the program, including faculty, meet weekly for seminars, discussions, and guest lectures on selected topics of general interest. A student normally spends four terms in the program and receives full credit for the Medical School advanced basic science requirement. Although the program traditionally begins in September, its structure is sufficiently flexible to accommodate those who wish to begin in any term, including the summer term.

For each student, the program consists of the following components:

1. An individual tutorial, carried out in association with a senior faculty member selected by the student, involves laboratory and/or library research in a particular area of endocrinology or reproductive biology. Before entering the program, students are requested to establish their tutorial arrangement with one of the program faculty. In order to facilitate this process, an opportunity will be provided to meet individually with the present program faculty or with other members of the Medical School faculty whose specialty and research interests would permit them to participate in the program.

2. The seminar, held weekly throughout the academic year, covers various topics in endocrinology and reproduction in a format designed to explore current concepts, primarily through critical reading and discussion of contemporary literature. The seminar utilizes the background and experience of all members of the program faculty, guest speakers, and active student participation to develop an integrated approach to basic problems in endocrinology and reproductive biology. Taken as a whole, the seminar series provides broad coverage of endocrine phenomena from a cell biology viewpoint as well as specific coverage of topics of special interest to current members of the program. In addition, the application of basic concepts to clinical problems and human disease is considered in order to provide continuity with future clinical training.

3. Lecture courses. There are no specific course requirements in this program. In order to provide additional breadth of preclinical experience related to immediate or long-term interests, students may take up to four units of course work per term in any of the elective courses approved for advanced basic science credit. Individual course selections are not limited to those related to endocrinology or reproductive biology, although consultation with one's preceptor is recommended before making final selections. Every term. Weight: 36. *Fellows, Anderson, Crenshaw, Everett, Lebovitz, Schomberg, and Tyrey*

EMP-300(B) and (C). Environmental Medicine Study Program, Third and Fourth Years. Environmental medicine is defined as the study of the effects produced in human subjects by exposure to environmental materials inhaled, ingested or contacted. The guiding concept of the Environmental Medicine Program is that the physician's role is learned best by working on problems and making decisions. This is readily accomplished when the student has a tutorial relationship to a faculty member. A nucleus of faculty from any participating departments promises an interdisciplinary approach to investigation in the program, unified by three weekly activities. First is a lecture and seminar course (PTH-372B) on health

problems of the environment and how they are investigated which is offered twice each year. The second is a research seminar on ongoing work. The third is a seminar on structure function correlations in human diseases related to environmental agents (PTH-374B). It correlates the features as perceived by the clinician, radiologist, epidemiologist, and pathologist.

In the third year, the student develops skills in one or perhaps two disciplines such as ultrastructure, microbiology, biochemistry, or physiology under a faculty tutor, selected by the student and the program committee. Problem identification, hypothesis development, experimental design, specific methods, and data analysis are emphasized. One option would be 12 weeks (Sept.-Dec.), of the research training program (RTP) and 6, 15, or 24 weeks of work on a problem employing these skills and related to environmental health. Continuous exposure to such problems and to diseases related to them would be provided in the seminars.

The fourth year program would emphasize human disease and approaches to health problems of individuals or populations. There would be ample opportunities to continue projects from the third year and to extend these to clinical studies.

Credit during the two years would be basic science or clinical, dependent upon the student's time commitments. Furthermore, credit would be carried in both the program and the discipline. For example, a student working in biochemistry would receive credit in biochemistry or in the environmental medical program (EMP-300 B and C.) This would ensure maximal flexibility for the student. Every term. Weight: 9 per 9 weeks. *Kilburn, Pratt, Cate, Kamin, Narahashi, Moses, Lynn, Spock, and Brumley*

ISP-201(B). Immunology Study Program. The objectives of this program will be to offer didactic training in basic immunology, supplemented by training in the biochemistry of macromolecules and molecular genetics. Student seminars in clinical and basic immunology will be supplemented by faculty seminars of work in progress plus the regular program of guest speakers in immunology. Each student will be required to participate in a preceptorship in one of the immunology laboratories, and will be expected to engage in a basic project leading to a publishable paper. Literature exploration will be encouraged as background, but a "reading preceptorship" will not be acceptable.

The student's time will be spent in the following activities:

1. Medical Immunology (new course number MIC-330)—6 credits. Six hours of class work per week, of which four hours will be didactic and two hours will consist of student seminar presentation of basic areas of immunology or patient presentations illustrative of immunologic principles or controversies.

Basic study of immune responses to antigenic substances. Special topics include congenital and acquired immunological deficiencies, humoral and cellular hypersensitivity, immunology and infectious diseases, immunohematology, autoimmune disease, the immunogenetics of transplantation, and tumor specific immunity. Case presentation where indicated and student seminars. Weight: 3 per 9 weeks. Terms: 1 and 2.

2. The taking of an additional formal course is optional, but will be strongly recommended. Most strongly suggested will be Macromolecules (BCH-293 for 4 credits for four hours a week) or Molecular Genetics (BCH-216 for 3 credits for three hours per week).

3. Current topics in immunology. Staff seminar, one or two hours per week.

4. Work in progress. Staff and graduate student seminar, one or two hours per week.

5. Guest seminar. Two hours per month.

6. Preceptorship. Approximately twenty hours per week of laboratory work. Terms: 3 and 4 (Spring, 1973). Weight: 18. *Oleinick, Sage, Amos, C. Buckley, R. Buckley, Ginn, Grothaus, Lauf, Metzgar, Rosse, Scott, Seigler, Smith, and Ward*

MRT-399(B). Medical Research Training Program. The Research Training Program is an interdepartmental program offered to third-year students and to qualified residents and fellows with the M.D. degree. The purpose of the program is to provide students with the theoretical background and practical experience necessary for a basic science approach to biomedical research. Operationally, the program can be divided into two parts:

1. From September to November, students receive an intensive and coordinated series of lectures and laboratory exercises in the areas of enzymology, protein chemistry, cellular and molecular ultrastructure, immunochemistry, molecular biology, virology, and active transport. Laboratory exercises are designed to give students practical experience in the use of various research techniques such as electrophoresis, chromatography, various immunochemical procedures, preparative and analytical centrifugation, spectrophotometry, growth, assay, and genetics of bacteria, bacteriophage, mammalian viruses and mammalian cells in tissue culture, use of radioisotopes, etc. Lecture material covers the theory of these laboratory exercises and includes a great deal of general information pertaining to the current state of knowledge in many areas of biomedical science. The purposes of the first three months of the course are to carefully and personally instruct students in the experimental techniques used in modern biomedical investigation, and to provide them with the background of basic scientific theory necessary to successfully carry out an individual research project during the second part of the course. During this time students spend a full eight hours per day in lecture and laboratory in continued contact with their colleagues and one or more instructors. A strong group interaction between students, fellows and staff contributes to an effective teaching and learning atmosphere.

2. From December to June, students spend this time working on individual research projects under the supervision of a faculty member. A student has a virtually unlimited choice of research projects and may elect to work in the laboratory of anyone in the Medical Center who is doing basic biomedical research. Staff and students meet once a week for approximately three months in the spring for a general seminar series, and in late May students present seminars on their research accomplishments to date.

A formal course in biostatistics meets throughout the year, and a set of four programmable Wang electronic calculators is available in the RTP classroom for the exclusive use of RTP students. Terms: 1, 2, 3, and 4. Weight: 9. *Kredich and Staff*

NSS-201(B). Neurosciences Study Program. The Neurosciences Study Program is an interdepartmental, interdisciplinary program designed to coordinate the study of neurobiology in the third year curriculum. The program permits the student an opportunity for independent study and growth in neurobiology under the guidance of several basic science faculty members engaged in research on the nervous system. In recent years significant developments in molecular biology, electron microscopy, neurophysiology, and neurochemistry have given us an approach to the understanding of brain function at a cellular and subcellular level. In addition increasing sophistication has been introduced in studies at an organismic

level. These developments provide hope for a greater understanding of the biologic basis of brain function; and tremendously increase our need for well-trained physicians to understand the fundamental basis of neurobiology for careers relevant to the specific area as well as to all of medicine.

The program will last for 36 weeks. Participation in the program will require active participation in a neurobiology study group tutorial and in a preceptorship with one of the basic science faculty members. The major emphasis of the program will be on individual laboratory research training under the preceptorship of one of the members of the training staff. In addition the trainee, in consultation with his preceptor, will be encouraged to enroll in one or two courses relevant to his special interests and career plans. A wide range of projects are available for interested students. For physiologic approaches to the nervous system, the laboratories of Drs. George Somjen, Antonio Escueta, John Moore, Frans Jobsis, and Wesley Cook are available. For pharmacology, the laboratory of Drs. Schanberg and Narahashi and for morphological studies, the laboratories of Drs. J. David Robertson, M. Steven Mahaley, F. Stephen Vogel, and Talmadge Peele are available. For virologic studies, the laboratories of Drs. John Griffith, Darrell Bigner, Nelson Levy, and Steven Mahaley are available. For biochemical studies, the laboratories of Drs. Stanley H. Appel, Ara Tourian, and Bernard Kaufman are available.

The neurobiology study group tutorial will permit students to gain understanding of several different aspects of neurologic science as well as topics in the biology of behavior. These meetings are held two times a month and consist of topics selected by the students from a list provided by the faculty members of the program. The range of topics include pertinent subjects of neuroscientific relevance such as aspects of macromolecular synthesis, neural development and function, neural subsystems and physiologic operations, communication and coding in the nervous system, recognition and control at a molecular level, and selected aspects of molecular neurobiology. In addition the students are required to attend Monday afternoon seminars from 4:00-6:00 p.m. which are part of the postdoctoral program in neurobiology. These sessions are given by postdoctoral students and cover subjects relevant to the biology of behavior and essential to an understanding of neurobiology.

At the termination of their laboratory experience, all students are required to submit a paper describing their work and accomplishments during the year. Students are encouraged to attend one meeting on a national level thought by their preceptors to be essential to their educational experience in the neurosciences. Terms: 1, 2, 3, and 4. Weight: 9 per 9 weeks. *Appel, Schanberg, Sonijen, Escueta, Vogel, Peele, Mahaley, and Tourian*

VSP-201(B). Virology Study Program. The objective is to indicate the relevance of investigative virology to problems of clinical medicine and to provide an introduction to recent advances in virus research. The program will consist of:

1. Lecture Series. The lecture series (2 per week) will be divided into General Animal Virology (10 lectures), an introduction in basic techniques in virology and a discussion of the molecular biology of major virus groups; Topics in Medical Virology (10 lectures), an introduction to cellular responses to virus infection, host responses to virus infection, and epidemiology, transmission, and pathogenesis; Tumor Virology (10 lectures), introductory lectures in chemical, radiological, and viral stimulation of cancers followed by in-depth lectures in RNA and DNA tumor viruses and the possible mechanisms by which these viruses cause cells to



become malignant; and Bacteriophages (4 lectures), applications of research with bacteriophage to problems in animal virology.

This course will be listed in the green book (MIC-304B) and thus will be available to all students.

2. Seminars. Two seminars per week. One seminar per week will be a direct extension in depth of the lectures as described above. One seminar per week will be devoted to topics in clinical virology.

3. Other Courses. Students in the program will have an option to take one additional relevant lecture course approved by the course directors. (See also Individual Tutorial.)

4. Individual Tutorial. During the remainder of the time each student will be supervised by a faculty member participating in the program in a study project that will reflect the student's interest in virology.

It was generally agreed by the planning committee that it would be most beneficial for a student to carry out a laboratory research project. Lectures and seminars have been planned so that students can spend at least five to six hours each day in the laboratory. This is essential if a student is to complete an in-depth investigation of a research project.

In the case that the program directors would approve a project of a different nature, the student again would be supervised by one of the participating faculty members. In a study project of this kind, a student might be expected to take more than one additional relevant course. (See the section on other courses.) Terms: 1 and 2 (Fall, 1972). Weight: 18. *Zweerink, Lang, Bonar, Cate, Daniels, Griffith, Hall, Harriman, Joklik, Katz, Levy, Luftig, Metzgar, Nichols, Oleinick, Smith, and Wilfert*

School of Nursing



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School of Nursing



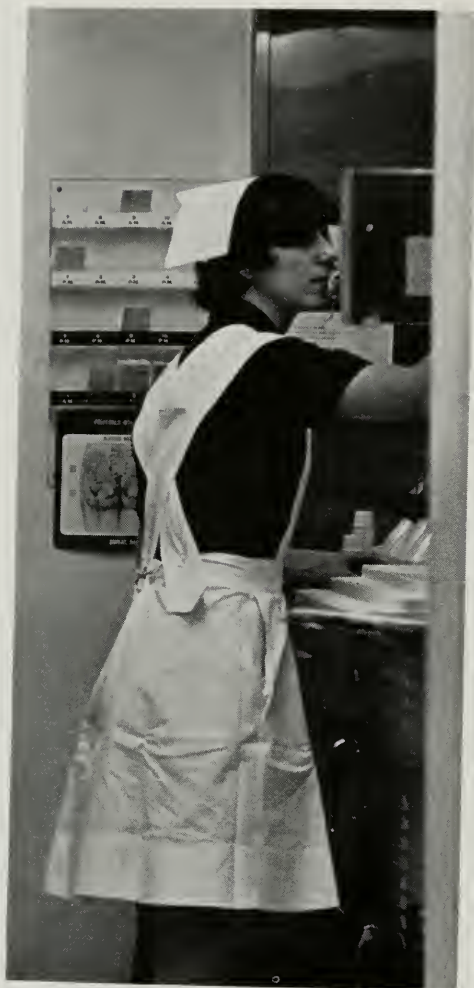
The Nursing Program

The School of Nursing offers a four year course of study leading to the degree of Bachelor of Science in Nursing. Thirty-two courses including small-group learning experiences and twelve upper division courses in nursing are required.

The first two years of the curriculum consist of required and elective courses in liberal arts and basic sciences. The third and fourth years consist of the required courses in the nursing major with provision for electives in arts and sciences or nursing. Opportunities are provided for students to undertake independent studies in nursing.

Early in the junior year, students participate in clinical nursing practice where they acquire knowledge, skills, and attitudes appropriate for professional nursing. Provision for elective courses in every semester enables the students to pursue a secondary or complementary field of interest, including the opportunity to acquire a double major. Option to pursue electives in nursing provides the opportunity for each student to begin specialization in clinical nursing. Other options may lead to entry into teaching, research, or administrative careers, or positions in mental health clinics and other community-health services.

Graduates are eligible to apply for examination for licensure as Registered Nurses in any state. Additional information may be obtained by writing for the Duke University *Bulletin of Undergraduate Instruction*.



Allied Health Professions



8

Allied Health Professions

Clinical Psychology Internship

The Division of Medical Psychology offers internship training in clinical psychology to qualified doctoral students. The program, approved by the American Psychological Association, provides experience in many contexts with a wide diversity of patients. The internship year is usually comprised of four service rotations of three months each, chosen from among six services. Additional features of the program include individual psychotherapy with children and adults; group psychotherapy and experience in mental health consultation; participation in seminars, conferences, and in certain joint activities with nearby clinical installations; and opportunities for individual scholarship and research. Correspondence concerning admission to the program should be sent to Dr. Derek Shows, Box 2995, Duke University Medical Center, Durham, North Carolina 27710.

Cytotechnology

Cytotechnology is a course of twelve months duration in technical and diagnostic aspects of exfoliative cytology for qualified individuals. Minimum requirements are two years of college with 12 semester hours of biology, which may include anatomy, histology, zoology, botany, and physiology. Although individuals with B.S. or A.B. degrees are given preference, applicants without degrees will be considered. One class is accepted annually on September 15. Graduates are awarded a certificate and are eligible to take the certifying examinations given by the Registry of Medical Technologists of the American Society of Clinical Pathologists.

The program consists of two parts: the first half is primarily devoted to theoretical and practical exercises in the techniques of exfoliative cytology and interpretation of the clinical material; the last half is comprised of practical training in all aspects of exfoliative cytology in the laboratory.

Additional information and applications for admission may be obtained from the Director of the program. William W. Johnston, M.D., Department of Pathology, Duke University Medical Center, Durham, North Carolina 27710.

Dietetics

A Dietetic Internship Program is available to individuals who have received a bachelor's degree in food and nutrition or institutional management and have met the requirements of the American Dietetic Association. The program consists of twelve months classroom instruction and clinical experience in food administration, nutritional care of patients, and participation in research programs. Following successful completion of the Dietetic Internship, certificates and membership in the American Dietetic Association are awarded.

Additional information may be obtained by writing M. H. McLachlan, M.A., Director, Dietetic Internship, Duke University Medical Center, Durham, North Carolina 27710.

Hospital Administration

Graduate education in hospital administration is offered through a twenty-four month program conducted jointly by the Duke University Graduate School



and Medical Center. The program consists of selected graduate courses and a twelve-month residency in hospitals and other health agencies. The Master of Hospital Administration degree is awarded to those who successfully complete the program.

Marshall I. and Sarah W. Pickens Scholarship. An annual award of \$2,000 is presented to a student in hospital administration on the basis of need and potential. In 1971 Mrs. Staunton Pickens established this award in recognition of her brother-in-law, Mr. Marshall I. Pickens' long association with the Duke Endowment and outstanding contribution in the field of hospital administration.

Additional information may be obtained by writing Program in Hospital Administration, Box 3018, Duke University Medical Center, Durham, North Carolina 27710.

Inhalation Therapy

In September, 1970, the Duke University Medical Center and the Durham Technical Institute initiated an associate degree program in inhalation therapy, under the medical direction of the Department of Anesthesiology. It is accredited by the Council on Medical Education of the American Medical Association and approved by the North Carolina State Board of Education.

The curriculum consists of twenty-two months of coordinated basic science courses, technical courses, and clinical practice.

Additional information and application forms may be obtained by writing Student Services Office, Durham Technical Institute, P. O. Box 11307, Durham, North Carolina 27703.

Medical Speech Pathology

The training program in speech pathology is designed to help meet the need for speech pathologists in medical centers. Candidates are accepted after completing basic academic training in speech pathology from approved institutions. Two trainees are accepted each year, one in September and the other in January; they are designated as Speech Pathology Fellows and may be appointed for one or two years.

Trainees have varied responsibilities in the Speech Pathology Clinic and may participate in the Cleft Palate Clinic, research projects, and the summer speech residential program held at Duke University.

A wide variety of speech defects are referred to the clinic from medical and surgical specialists at the Duke Medical Center. Opportunities are provided for the trainees to participate in cooperative research projects and observe surgical approaches to some speech defects. The senior staff and the director of the training program closely supervise all trainees.

Additional information may be obtained by writing Raymond Massengill, Jr., Ed.D., Director, Medical Speech Pathology, Duke University Medical Center, Durham, North Carolina 27710.

Medical Technology

A twelve-month training program is available to men and women who have

successfully completed a minimum of three years of college in an accredited school. Preference is given to those individuals who have been awarded a baccalaureate degree. Applicants must have successfully completed at least 90 semester hours including 16 in chemistry and 16 in biological sciences and 3 hours in mathematics. Courses in anatomy, bacteriology, genetics, immunology, physiology, and physics are recommended. Courses in English, social sciences, and humanities are desirable.

The training program includes clinical biochemistry, clinical microscopy, radioisotope theory, microbiology and immunology, immunochemistry, parasitology, introduction to clinical pathology, and serologic and histologic techniques. Upon successful completion of the program, students are qualified for examination and certification by the Registry of Medical Technologists of the American Society of Clinical Pathologists. The program is approved by the Council of Medical Education and Hospitals of the American Medical Association.

Additional information may be obtained by writing Mary S. Britt, M.S., Registrar and Teaching Supervisor of Medical Technology, Department of Pathology, Duke University Medical Center, Durham, North Carolina 27710.

Nuclear Medicine

A twelve-month program of instruction and clinical training approved by the American Medical Association is available in nuclear medicine technology, Division of Nuclear Medicine, Department of Radiology. The program consists of three months of intense didactic and laboratory preclinical courses followed by a nine-month internship in the clinical aspects of nuclear medicine technology. The nine-month internship is limited to individuals who have successfully completed the preclinical course, including nuclear physics and instrumentation, radiopharmacy, radiation safety and health physics, mathematics, and radiation biology. Classes are held five days per week and consists of lectures, classroom demonstrations, laboratory sessions, and seminars.

The nine-month internship consists of scheduled rotation through all areas of the clinical laboratory. Personal instruction and training are given in blood volume-red cell mass determinations, renograms, scanning, research techniques, thyroid function studies, placental localization, and others. Training is augmented with continued classroom and laboratory work.

Students who successfully complete the nine-month internship receive a certificate and meet the educational requirements established by the existing Nuclear Medicine Technology Registries.

Applications will be accepted for consideration from those who have earned an associate or baccalaureate degree in any field of science, registered or registry-eligible radiologic technologists, registered or registry-eligible medical technologists, and those with equivalent credentials who are recommended by the Admissions Committee of the Division of Nuclear Medicine. All applications must be received by May 1 and notification concerning admission will be forwarded by May 15.

Additional information and application forms may be obtained by writing the Director, Box 3166, Division of Nuclear Medicine, Department of Radiology, Duke University Medical Center, Durham, North Carolina 27710.

Nurse Anesthetists

The teaching and training program in the Department of Anesthesiology is

comprised of the theoretical aspects and clinical application of all accepted drugs and techniques used in anesthesiology. The program requires twenty-four months of training with the major portion of the basic theoretical instruction given during the first three quarters. Following a preclinical period of eight weeks, clinical practice parallels the theoretical program. Well qualified registered nurses are accepted September 1 for enrollment the following January. Graduates are eligible for membership in the American Association of Nurse Anesthetists following successful completion of the required qualifying examination.

Additional information may be obtained by writing Mary B. Campbell, R.N., CRNA, P. O. Box 3094, Duke University Medical Center, Durham, North Carolina 27710.

Pastoral Care and Counseling

Graduate programs in pastoral care and counseling are available to clergy of all religious groups. Programs are designed to train ordained individuals who desire to specialize in pastoral care and counseling or to enhance their skills as parish clergy. Those who enroll in the programs will be required to serve as chaplains or as pastoral counselors in the Medical Center or in the community of Durham. Didactic studies are interspersed through the clinical phase of training by conferences and courses offered in the Medical Center and the Divinity School.

All programs in clinical pastoral education are approved by the Association for Clinical Pastoral Education, Inc.

Additional information may be obtained by writing the Coordinator of Clergy Training, Box 3112, Duke University Medical Center, Durham, North Carolina 27710.

Assistant Professor: P. Wesley Aitken, B.D. (Duke, 1955), Th.M. (Duke, 1961), *Director and Supervisor*.

Training Supervisors: John C. Detwiler, B.D. (Union Theological Seminary, N. Y., 1962), Th.M. (Duke, 1963); William C. Spong, B.D. (Episcopal Theological Seminary, Virginia, 1959), Th.M. (Duke, 1964).

Pathology Assistants

The Pathology Assistant Program is designed to meet the growing need for trained personnel in the field of pathology. A certificate is issued upon successful completion of the course.

The training requires one or two years depending upon past education, experience, and progress. The first six months are devoted to didactic and laboratory instruction. The remainder of the course is interdepartmental consisting primarily of practical experience in the Department of Pathology.

Prerequisites are (1) a degree from an accredited college, or eligibility for a B.A. or B.S. degree, or (2) two years of an academic curriculum in a junior college, or (3) high school diploma and a minimum of two years' experience as a medical corpsman.

Prospective students are required to complete an application form, and submit an official high school or college transcript, and three letters of recommendation. A personal interview is recommended.

Application forms and additional information may be obtained by writing Kenneth R. Broda, Teaching Supervisor, Pathology Assistant Program, Department of Pathology, Duke University Medical Center, Durham, North Carolina 27710.

Physical Therapy

A two year graduate curriculum in physical therapy, leading to a Master of Science degree from Duke University, is offered for students entering the field. This program is designed to provide a broad foundation in the art and science of physical therapy and to provide opportunities for the development of skills in health administration and supervision, curriculum development and directed teaching in physical therapy, and in advanced clinical education or research. Completion of the curriculum requires two academic years and a summer practicum totaling 52 units (minimum) of graduate course work or equivalent academic exercise—30 to 32 units of which are in physical therapy, 12 in designated courses in anatomy and physiology, and the remainder in electives in related fields.

Courses of instruction are listed in the *Bulletin of the Graduate School*

Additional information may be obtained by writing Miriam J. Jacobs, Ph.D., Professor and Chairman, Department of Physical Therapy, Duke Hospital, Box 3247, Durham, North Carolina 27710.

Physician's Associates

The Duke University Physician's Associate Program, initiated in 1965 as the Physician's Assistant Program, was created to prepare health professionals who could carry out many traditional physician functions under the direction and supervision of a physician and, thereby, extend the physician's reach to a greater patient population.

In the clinical and hospital setting, the physician's associate takes detailed patient histories, performs comprehensive physical examinations, requests and carries out numerous laboratory and diagnostic procedures, collects and screens laboratory data, prepares narrative case summaries, and instructs patients as to the regimen prescribed by the physician. He is highly skilled, virtually unrestricted, and able to provide tasks, services, and functions which are not currently provided by other types of health personnel. Proper utilization of his services can enable a physician's practice to function in a more efficient, effective and economical manner.

The professional curriculum of the program is twenty-four months in duration and has been developed to provide all students with a broad understanding of the medical sciences and their application to a clinical discipline. The curriculum includes an academic year devoted to the basic medical sciences including anatomy, physiology, pharmacology, clinical medicine, electrocardiography, radiology, pathology, and physical examination, coupled with fifteen months of clinical teaching conducted in a variety of clinical settings.

Students are admitted to the program during the month of September. Selection is based on an applicant's academic record and health related experience, aptitude test scores, evidence of good character, and general fitness. Each applicant must submit documentation of graduation from high school or its equivalent (preference is given to students with two or more years of transferable college credit); evidence of previous experience in the health field with at least 2000 hours involving direct patient contact; results of the verbal and math portions of the Scholastic Aptitude Tests of the College Entrance Examination Board; and a completed application form and transcript records from high school, colleges, and professional schools. The program is approved by the Veterans Administration for G. I. Bill benefits.

Additional information may be obtained by writing the Physician's Associate Program, P. O. Box 2914, Duke University Medical Center, Durham, North Carolina 27710.

Prosthetic and Orthopaedic Appliances

The function of this program is to train individuals to assist the physician in a prescription of prosthetic and orthotic appliances on individual patients. The necessary measurements of the individual patient are then taken and the appliance is designed and made in the department. The appliance is then fit and aligned in accordance with the prescription and the patient's individual disability.

Candidates who have satisfactorily completed four years of training and successfully completed the required university courses are then eligible to take the examination given by the American Board of Certification in Orthotics and Prosthetics.

Additional information may be obtained by writing to: Mr. Bert R. Titus, C.P.O., Director, Assistant Professor, Department of Prosthetics and Orthotics, Duke University Medical Center, Durham, North Carolina 27710.

Radiation Therapy Technology

Two training programs are available in the field of radiation therapy technology. One is a twenty-four month program which is open to anyone who has graduated from high school. The other program is a twelve-month program open to anyone who is registered or registry-eligible in either radiologic technology or nuclear medicine technology and to registered nurses who have had a college course in physics.

The training programs consist of intensive study of radiation physics, characteristics of tumors and related clinical, physical, and biological concepts as well as general knowledge and experience in the care of cancer patients.

All didactic teaching is given at the Division of Allied Health Sciences at the V. A. Hospital. The clinical training is given at the Therapeutic Radiology Department at Duke University and other nearby radiation therapy facilities.

Additional information may be obtained by writing to the Assistant Director, Radiation Therapy Technology Program, School of Allied Health Sciences, Educational Building, V. A. Hospital, 508 Fulton Street, Durham, North Carolina 27705.

Radiologic Technology

Radiologic technology offers students interested in the allied health field of radiologic technology two programs of instruction.

The first, open to both high school graduates and those with some college experience, consists of a two-year course of instruction and practical training leading to certification by the American Registry of Radiologic Technologists. Between 30 and 35 students are admitted each September 1 for the Certificate Program.

The second, in affiliation with Elon College, enables students to obtain, through a four-year curriculum, a bachelor of science degree in radiologic technology along with ARRT certification. Students accepted in this program take two years of study in liberal arts at Elon College and then come to Duke University Medical Center for the last two years of clinical training and didactic study.

The Duke programs in radiologic technology are approved by the American College of Radiology, the American Medical Association's Council on Medical Education, the American Society of Radiologic Technologists and the American Registry of Radiologic Technologists.

Additional information may be obtained by writing John B. Cahoon, Jr., R.T., Director, Radiologic Technology, Department of Radiology, Duke University Medical Center, Durham, North Carolina 27710.

Veterinary Medicine

The function of veterinary medicine is to facilitate the various teaching and research programs that require laboratory animals. Veterinary medical consultation is provided for research projects in which experiments are conducted on animals. Assistance is made available in selecting the most suitable species or strain of laboratory animal to use in a given study. In addition, animals are procured, quarantined, and appropriately conditioned in order to provide a highly reliable biological tool. A wide variety of technical services are carried on, such as providing whole blood of a variety of species, collecting biological specimens, providing clinical pathologic examinations, preparing animals for surgery, post-surgical care, and most maintenance of animal colonies.

The department collaborates with those departments of the School of Medicine that utilize laboratory animals in their teaching program. Various disease states are experimentally produced in animals for student observation and study, and techniques for collecting biological specimens for additional study are demonstrated. Aid is given in setting up and carrying out demonstrations and studies in animals.

The veterinary medical staff teaches an introductory course in animal experimentation which is required for physician's associate trainees. Plans are under way to make this course available to others and offer additional courses of study.

Independent and interdepartmental research programs on some of the spontaneous disease of laboratory animals are performed by the staff and other investigators.

Additional information may be obtained by writing John LeMay, D.V.M., Chairman, Department of Veterinary Medicine, Duke University Medical Center, Durham, North Carolina 27710.

Associate Professor John LeMay, D.V.M. (Georgia, 1959), *Chairman*; Assistant Professor Bobbie F. Sherwood, D.V.M. (Georgia, 1959).

Appendix

ROSTER OF HOUSE STAFF BY DEPARTMENTS

Medicine

Chief Residents: Bryon D. McLees, M.D. (Duke, 1967). James G. Nuckolls, M.D. (Duke, 1966).

Senior Residents: Elizabeth T. Anderson, M.D. (Harvard, 1969), Harvey A. Feldman, M.D. (Pennsylvania, 1967), Irving H. Fox, M.D. (McGill, 1967), John A. Manfredi, M.D. (Jefferson, 1966), Robert F. Miller, M.D. (Duke, 1967), John Northup, M.D. (Yale, 1967), William W. O'Neill, M.D. (Oklahoma, 1969), Michael D. Parker, M.D. (Duke, 1968), Arnold E. Postlethwaite, M.D. (Cornell, 1966), David L. Smith, M.D. (Duke, 1966), Anthony S. Tornay, M.D. (Jefferson, 1969), H. James Williams, M.D. (Utah, 1969).

Junior Residents: Clarence W. Applegate, M.D. (Harvard, 1970), John C. Boniface, M.D. (Florida, 1970), William N. Brandt, M.D. (Indiana, 1968), Michael D. Coleman, M.D. (Duke, 1970), Jonathan Dranov, M.D. (Pennsylvania, 1969), Marc K. Drezner, M.D. (Pittsburgh, 1970), Donald J. Filip, M.D. (Wayne State, 1969), Earl W. Ferguson, M.D. (Texas, 1970), Paul T. Forth, M.D. (Duke, 1970), Harry A. Gallis, M.D. (Duke, 1967), Arnold R. Hudson, M.D. (Loma Linda, 1967), Daniel J. Hurst, M.D. (Chicago, 1967), William R. Kenny, M.D. (Chicago, 1967), Craig S. Kitchens, M.D. (Florida, 1970), Robert J. Margolis, M.D. (Duke, 1971), John L. Meisel, M.D. (Pennsylvania, 1970), Richard E. Ostlund, M.D. (Utah, 1970), John B. Reed, M.D. (Harvard, 1970), Lucian C. Rice, M.D. (Emory, 1970), Cecil O. Samuelson, M.D. (Utah, 1970), Charles H. Scoggin, M.D. (Colorado, 1970), Daniel C. Scullin, M.D. (Ohio State, 1970), Robert W. Tucker, M.D. (Harvard, 1970), John R. Ujda, M.D. (Marquette, 1969).

Interns: Robert S. Adelaar, M.D. (Pennsylvania, 1971), Dana K. Andersen, M.D. (Duke, 1972), John T. Baker, M.D. (Harvard, 1971), Charles F. Bethea, M.D. (Oklahoma, 1971), Stephen C. Beuttel, M.D. (Duke, 1971), Thomas R. Borthwick, M.D. (Jefferson, 1971), Thomas A. Brasitus, M.D. (Jefferson, 1971), Laurence E. Carroll, M.D. (Pennsylvania, 1971), William A. Cies, M.D. (Duke, 1971), Walter H. Cobbs, M.D. (Duke, 1971), John S. Derbyshire, M.D. (Ohio, 1971), Ronald B. Easley, M.D. (Oklahoma, 1971), Miles Elmore, M.D. (South Carolina, 1971), Arnold J. Felsenfeld, M.D. (Duke, 1971), James E. Fish, M.D. (Northwestern, 1971), Clyde D. Ford, M.D. (Utah, 1971), John N. Glover, M.D. (Northwestern, 1971), Donald A. Greeley, M.D. (Illinois, 1971), Constantine A. Haliasos, M.D. (Duke, 1971), Janet G. Hickman, M.D. (Harvard, 1971), Robert E. Hickman, M.D. (Harvard, 1971), McDonald K. Horne, M.D. (Duke, 1971), Jonathan R. Insel, M.D. (Boston Univ., 1971), Charles J. Jaffe, M.D. (Duke, 1972), William M. Kettle, M.D. (Harvard, 1971), Clold R. Kidd, M.D. (Baylor, 1971), Eugene W. Linfors, M.D. (Duke, 1971), Elizabeth A. London, M.D. (Jefferson, 1971), Randall G. Michel, M.D. (Duke, 1971), Michael L. Nash, M.D. (Duke, 1971), Donald M. Pehlke, M.D. (Duke, 1972), Richard A. Reinhart, M.D. (Ohio, 1971), Richard L. Rutherford, M.D. (Duke, 1971), Paul F. Ryan, M.D. (Duke, 1972), Carl P. Sahler, M.D. (Rochester, 1971), Augustin J. Schwartz, M.D. (Jefferson, 1971), Timothy C. Smith, M.D. (Ohio, 1971), Robert W. Swisher, M.D. (Med. College of Virginia, 1971), Addison A. Taylor, M.D. (Missouri, 1971), Roger R. Williams, M.D. (Utah, 1971).

Fellows: Richard R. Almon, Ph.D. (Illinois, 1971), Judith C. Andersen, M.D. (Jefferson, 1969), William J. Arnold, M.D. (Illinois, 1969), John A. Baldrige, M.D. (Arkansas, 1966), Anne P. Ball, Ph.D. (Auburn, 1970), Alan G. Bartel, M.D. (Florida, 1966), Richard A. Berman, M.D. (Pittsburgh, 1970), Robert H. Bilbro, M.D. (North Carolina, 1967), Bruce M. Birch, M.D. (Virginia, 1967), Carl H. Bivens, M.D. (Med. College Virginia, 1967), Alan S. Brenner, M.D. (Pennsylvania, 1968), Thomas J. Burke, Ph.D. (Houston, 1970), Herwig C. Carton, M.D. (Univ. Leuven, Belgium, 1961), Richard F. Cohen, M.D. (Albert Einstein, 1966), M. Clark Colvard, Jr., M.D. (Tennessee, 1966), Roberto Cotrufo, M.D. (Univ. Naples, Italy, 1968), Sadye B. Curry, M.D. (Howard, 1967), Walter E. Davis, M.D. (Duke, 1966), Richard H. Dixon, M.D. (Duke, 1969), Larry P. Ebbert, M.D. (Ohio State, 1969), Thomas W. Fauntleroy, M.D. (Duke, 1969), Michael S. Fedotin, M.D. (Ohio, 1968), Leonard N. Feingold, M.D. (Downstate Med. Center, 1968), David B. Gilbert, M.D. (Colorado, 1965), Marcel Gilbert, M.D. (Laval Univ., France, 1967), William C. Greenman, M.D. (Florida, 1968), Lyle D. Griffith, M.D. (Univ. Washington, 1968), Wolfgang Gröbner, M.D. (Univ. Heidelberg, 1966), Lura Ann Harrison, Ph.D. (Oklahoma, 1969), Jerry M. Herron, M.D. (Ohio State, 1965), Edward W. Holmes, M.D. (Pennsylvania, 1967), Arnold R. Hudson, M.D. (Loma Linda, 1967), Akiro Ito, M.D. (Hyusha Univ., Japan, 1962), Rubens Jansen, M.D. (Univ.

Parana, Brazil, 1966), Harry B. Kelso, M.D. (Texas, 1965), James E. Krook, M.D. (Minnesota, 1969), Ross T. Krueger, M.D. (Case Western Reserve, 1966), Peter B. Leff, M.D. (Med. College Virginia, 1967), Philip A. McHale, B.S. (Arizona, 1967), Carlo Marchesi, Ph.D. (Padua Univ., Italy, 1967), Raymond L. Marecek, M.D. (Arkansas, 1964), William I. Mariencheck, M.D. (Tennessee, 1965), Bruce Marsh, M.D. (Tennessee, 1958), Kenneth M. Matchett, Jr., M.D. (Cornell, 1967), James A. Merchant, M.D. (Iowa, 1966), Gene E. Myers, M.D. (Pennsylvania, 1969), Gabriel L. Navar, Ph.D. (Mississippi, 1966), Michael D. Parker, M.D. (Duke, 1968), Michael A. Passero, M.D. (Harvard, 1969), William B. Ralph, M.D. (Vanderbilt, 1967), Charles M. Ramsdell, M.D. (Louisiana State Univ., 1965), Henry S. Richter, M.D. (New York Univ., 1968), Allen D. Roses, M.D. (Pennsylvania, 1967), Stephen G. Rostand, M.D. (Tufts, 1965), Carl J. Rubenstein, M.D. (Duke, 1967), Arthur B. Simon, M.D. (Illinois, 1964), Jay S. Skyler, M.D. (Jefferson, 1969), Richard C. Slagle, M.D. (Oklahoma, 1969), William H. Spencer, M.D. (Duke, 1965), E. Walker Stevens, M.D. (North Carolina, 1966), Dwight R. Stickney, M.D. (Ohio State, 1969), Thomas A. Sullivan, M.D. (Duke, 1965), Andre R. Ticzon, M.D. (Manila Central Univ., 1965), Francis X. Walsh, M.D. (Pennsylvania, 1966), Robert A. Waugh, M.D. (N. Y. Med. Coll., 1967), John R. Wolfe, M.D. (Virginia, 1967), Ronald F. Yatteau, M.D. (Med. Coll. of Virginia, 1966), W. B. Jerry Younger, M.D. (Washington Univ., 1969).

DIVISION OF NEUROLOGY

Chief Residents: J. Gordon Burch, M.D. (Univ. Alberta, Canada, 1967), William J. Elias, M.D. (Vanderbilt, 1965).

Residents: J. David Cook, M.D. (Duke, 1969), Stanley B. Holstein, M.D. (Georgetown, 1967), Ulf Kunze, M.D. (Univ. Berlin, 1966), Ian M. Lev, M.D. (Jefferson, 1968), Vinod Patel, M.D. (Kerala, Tribandam, India, 1970), Andreas J. Steck, M.D. (Univ. Berne, Switzerland, 1969), David M. Treiman, M.D. (Stanford, 1967).

DIVISION OF DERMATOLOGY

Chief Residents: Bernard J. Cahn, M.D. (Iowa, 1966), Thomas L. Standlee, M.D. (St. Louis Univ., 1967).

Residents: Ronald P. Benjamin, M.D. (Johns Hopkins, 1964), E. Edward Burton, Jr., M.D. (Med. Coll. of Virginia, 1968), Melvin L. Elson, M.D. (Duke, 1969), Edgar Maeyans, Jr., M.D. (Tennessee, 1969), Roy S. Rogers, III, M.D. (Ohio State, 1966), John R. Vydareny, M.D. (Michigan, 1968).

Obstetrics and Gynecology

Chief Residents: Richard C. Bechtel, M.D. (Duke, 1966), Jerry L. Danford, M.D. (Duke, 1967).

Assistant Residents: Sezer Aksel, M.D. (Duke, 1970), Lynn G. Borchert, M.D. (Michigan, 1968), Joseph S. Buffington, M.D. (Duke, 1971), Stephen L. Curry, M.D. (Syracuse, 1970), Michael D. Fried, M.D. (New York Univ., 1971), Garlan R. Giles, M.D. (Duke, 1969), Samuel J. Gilmore, M.D. (Indiana, 1968), Thomas F. Henley, M.D. (Duke, 1968), Philip G. Hoffman, Jr., M.D. (Duke, 1971), D. E. Darnell Jones, M.D. (Duke, 1968), Daniel H. Riddick, M.D. (Duke, 1967), Bruce Romig, M.D. (George Washington, 1971), Forrest O. Smith, M.D. (Duke, 1970), John C. Weed, Jr., M.D. (Tulane, 1968).

Faculty Fellows: W. Allen Addison, M.D. (Duke, 1960), Marcos Julio Pupkin, M.D. (Univ. Chile, 1960).

Ophthalmology

Chief Residents on rotating basis.

Residents: Martin E. Pearlman, M.D. (Michigan, 1967), Richard L. Pietsch, M.D. (Virginia, 1966), Charles F. Sydnor, M.D. (Virginia, 1969).

Assistant Residents: Robert E. Baker, M.D. (Med. Coll. of Virginia, 1968), Richard P. Carroll, M.D. (Stritch, 1966), Nelson B. Dobbs, Jr., M.D. (Med. Coll. of Georgia, 1968), C. Richard Epes, M.D. (Virginia, 1968), H. Randolph Frank, M.D. (Alabama, 1969), Peter M. Holland, M.D. (New York Med. Coll., 1969), M. Bruce Shields, M.D. (Oklahoma, 1966), Paul R. Yoder, Jr., M.D. (Virginia, 1967).

Pathology

Assistant Residents: Carlos Abramowsky, M.D. (Panama, 1968), Frank O. Bastian, M.D. (Saskatchewan, 1964), Carol G. Brown, M.D. (St. Louis Univ., 1970), Bryon Croker, M.D. (Duke, 1971), Ph.D. (Duke, 1971), David A. Denman, M.D. (Arkansas, 1968), Neil M. Dunn, M.D. (Duke, 1969), Americo A. Gonzalvo, M.D. (Univ. of Madrid, Spain, 1966), Samuel P. Hawes, M.D. (Vanderbilt, 1967), John Harrelson, M.D. (Duke, 1965), Albert S. Hollingsworth, M.D. (Med. Coll. of Georgia, 1968), Lewis G. Lafer, M.D. (Virginia, 1969), Gilbert G. Maw, M.D. (Duke, 1970), Ralph C. McCoy, M.D. (Emory, 1967), James Miller, M.D. (Duke, 1970), Peter S. Noce, M.D. (Case Western Reserve Univ., 1971), Ph.D. (Case Western Reserve Univ., 1968), Linda E. Norton, M.D. (Duke, 1971), Fred Odere, M.D. (George Washington Univ., 1970), Patricia O'Shea, M.D. (Johns Hopkins, 1970), R. J. Slaughter, M.D. (Chicago, 1967), Raymond J. Squires, M.D. (Emory, 1969), Lawrence A. Virgilio, M.D. (State University of New York, Upstate, 1970), Robin T. Vollmer, M.D. (Duke, 1967).

Intern: Sandra Preissig, M.D. (Tennessee, 1971).

Fellows: Peter C. Burger, M.D. (Northwestern, 1966), Thomas C. Graham, D.V.M. (Tuskegee Institute, 1969), Marshall D. Graham, Ph.D. (Duke, 1971), James L. Hall, M.D. (Michigan, 1968), Joan G. Milner, M.D. (Downstate Medical Center, New York, 1969).

Pediatrics

Senior Assistant Residents: John C. Edlin, M.D. (Tennessee, 1968), Edward S. Martin, M.D. (Pennsylvania, 1969), Mary Ann Passero, M.D. (Harvard, 1969), Robert Schwartz, M.D. (Florida, 1968), Sandra Smith, M.D. (Duke, 1967), Richard Thaller, M.D. (Missouri, 1969).

Junior Assistant Residents: Michael Baten, M.D. (Duke, 1971), Elaine Z. Belmaker, M.D. (Duke, 1971), Thomas J. Hart, M.D. (Illinois, 1970), Margaret Miller, M.D. (Duke, 1969), John O'Shea, M.D. (Johns Hopkins, 1970), Eric Ottesen, M.D. (Harvard, 1970), O. Carter Snead, M.D. (West Virginia, 1970), Martha Valiant, M.D. (Duke, 1969), John Wexler, M.D. (Duke, 1970), Robert E. Wood, M.D. (Vanderbilt, 1970).

Interns: David R. Brown, M.D. (Harvard, 1971), Kenneth Falterman, M.D. (Louisiana State, 1971), Leonard Freedberg, M.D. (Harvard, 1971), Joanna Haskell, M.D. (Western Reserve, 1971), J. Robert Henson, M.D. (Cincinnati, 1971), Pamela G. Kidd, M.D. (Baylor, 1971), Douglas S. Lloyd, M.D. (Duke, 1971), Barbara Manroe, M.D. (Stanford, 1971), Susan Prince, M.D. (Duke, 1971), Robert Rixse, M.D. (Duke, 1972), Olle Jane Sahler, M.D. (Rochester, 1971), Gerald Serwer, M.D. (Duke, 1972), William Topper, M.D. (Thomas Jefferson, 1971), William Wilkoff, M.D. (Harvard, 1971).

Fellows: Ann Alexander, M.D. (Duke, 1966), Page Anderson, M.D. (Duke, 1963), Maxine Asnis, M.D. (New York, 1968), Laura Gutman, M.D. (Stanford, 1962), Mary Pat Hemstreet, M.D. (Temple, 1968), David Lefkowitz, M.D. (Tulane, 1966), Louis Levy, M.D. (Vanderbilt, 1966), Paul A. Lusman, M.D. (New York, 1966), Michael Ramsey, M.D. (Duke, 1969), Beverly Raney, M.D. (Pennsylvania, 1965), Mark Rogers, M.D. (Upstate Medical Center, 1969), Ronald Seningen, M.D. (Duke, 1968), Amal Shamma, M.D. (Lebanon, 1968), Mohammad O. Tomeh, M.D. (Damascus, 1967).

Psychiatry

Chief Resident: David M. Hawkins, M.D. (Duke, 1965).

Residents: Marguerite B. Benway, M.D. (Miami, 1957), George S. Freedman, M.D. (Kentucky, 1966), David M. Gottesman, M.D. (Albany Med. Coll., 1966), Elliott B. Hammett, M.D. (Duke, 1966), James R. Johnson, M.D. (Duke, 1966), S. David Morrison, M.D. (Tennessee, 1965).

Assistant Residents: Stephen F. Asnis, M.D. (New York Univ., 1967), Robert H. Belmaker, M.D. (Duke, 1971), William H. Beute, M.D. (Wayne State, 1969), Andrew J. Bockner, M.D. (Jefferson, 1969), Winkler D. Bond, M.D. (Tennessee, 1968), Thomas P. Bridge, M.D. (Med. Coll. of Virginia, 1971), David K. Buckley, M.D. (Duke, 1971), Helen E. Courvoisie, M.D. (South Carolina, 1970), Carl J. Gerber, M.D. (Duke, 1967), William N. Grosch, M.D. (Albany Med. Coll., 1970), Harry C. Henderson, III, M.D. (Creighton, 1969), David P. Hill, M.D. (Duke, 1969), Alan J. Horowitz, M.D. (Duke, 1971), C. Raymond Lake, M.D. (Duke, 1972), David L. McCann, M.D. (Maryland, 1971), Lawrence M. Martin, M.D. (Mississippi, 1969), Leslie F. Major, M.D. (Duke, 1971), Frank A. Miller, M.D. (Buffalo, 1970), Paul C. Mohl, M.D. (Duke, 1971), L. Dan Montgomery, M.D. (Bowman Gray, 1969), James T.

Moore, M.D. (Missouri, 1971), Janet E. Mules, M.D. (Maryland, 1963), Eric W. Petersen, M.D. (Duke, 1971), Steven G. Potkin, M.D. (Washington Univ., 1971), J. David Ruffner, M.D. (West Virginia, 1970), Fernando Ruiz, M.D. (Univ. of Chile, 1965), Walter A. Scarborough, Jr., M.D. (Duke, 1967), Betty G. Stewart, M.D. (Duke, 1965), Donald J. Williams, M.D. (Duke, 1967).

Fellows: David H. Allen, M.D. (Washington Univ., 1964), G. LaVonne Brown, M.D. (Duke, 1967), Albert H. T. Doss, M.D. (Egyptian Univ., 1932), Nancy E. Jernigan, M.D. (UNC, 1965), Soong H. Lee, M.D. (Seoul National Univ., 1963), Leo Potts, M.B., B.S. (Adelaide, Australia, 1955), Michael R. Volow, M.D., Seton Hall, 1964).

Radiology

Chief Residents: Wiley R. Bland, M.D. (Duke, 1966), Terence Moore, M.D. (Duke, 1968), Geoffrey A. Wardwell, M.D. (Ohio State, 1968).

Residents: Ronald B. Addlestone, M.D. (Emory, 1968), Kenneth Allen, M.D. (Duke, 1966), Eric D. Alpert, M.D. (Duke, 1970), Merle H. Barth, M.D. (Indiana, 1967), Wiley Ray Bland, Jr., M.D. (Duke, 1966), Michael Allen Block, M.D. (Duke, 1968), Steven H. Boswell, M.D. (Baylor, 1969), John D. Coan, M.D. (Med. Coll. of Virginia, 1968), Howard Cockrill, Jr., M.D. (Arkansas, 1968), Richard H. Daffner, M.D. (SUNY, 1967), Peter J. Dempsey, M.D. (St. Louis, 1966), Walter H. Forman, M.D. (Florida, 1970), Robert Gordon, M.D. (Duke, 1970), Herbert D. Helbig, M.D. (Indiana, 1968), Z. Stanley Herc, M.D. (New Jersey Coll. of Med., 1967), Trent A. Johnson, M.D. (Southern California, 1969), James M. Jones, M.D. (Baylor, 1969), John D. Kreinces, M.D. (SUNY, Downstate, 1969), Nicholas Kutka, M.D. (Brattslava, 1951), James L. Lowry, M.D. (Baylor, 1969), Charles T. Lynch, M.D. (Duke, 1967), Stuart J. Masters, M.D. (Duke, 1969), Ernest Milner, M.D. (SUNY, Downstate, 1968), Terence N. Moore, M.D. (Duke, 1968), Gerald F. Nieters, M.D. (St. Louis Univ., 1966), Robert Older, M.D. (Duke, 1968), John R. Olson, M.D. (Indiana, 1968), Norman T. Pay, M.D. (Univ. of Phillipines, 1968), Joseph F. Phillips, M.D. (Emory, 1969), James M. Prochaska, M.D. (Baylor, 1969), Garrett F. Saikley, M.D. (Duke, 1971), Ronald P. Seningen, M.D. (Duke, 1968), Seymour Stifel, M.D. (Chicago Med. School, 1966), Steven L. Stroup, M.D. (Illinois, 1968), Geoffrey A. Wardwell, M.D. (Ohio State, 1968), Henry O. Williams, M.D. (Baylor, 1970).

Interns: Terrence S. Carden, Jr., M.D. (Jefferson Med. Coll., 1971), Parham R. Fox, M.D. (Med. Coll. of Virginia, 1971).

Surgery

DIVISION OF GENERAL AND THORACIC SURGERY

Instructor and Teaching Scholar: Walter G. Wolfe, M.D. (Temple, 1963).

Instructors and Chief Residents: Robert W. Anderson, M.D. (Northwestern, 1964), Don E. Detmer, M.D. (Kansas, 1965), Sewell H. Dixon, M.D. (Emory, 1964), S. Kirby Orme, M.D. (Cornell, 1963).

Fellows: M. Wayne Flye, M.D. (UNC, 1967), James C. A. Fuchs, M.D. (Johns Hopkins, 1964), Alfred S. Gervin, M.D. (Duke, 1969), Carl C. Gill, M.D. (Oklahoma, 1969), C. Lynwood Puckett, M.D. (Bowman Gray, 1966), Franklin L. Rosenfeldt, M.D. (Univ. of Adelaide, 1963), Andrew S. Wechsler, M.D. (New York Univ., 1967).

Senior Assistant Residents: James A. Alexander, M.D. (Duke, 1966), Fred A. Crawford, M.D. (Duke, 1967), David L. Dalton, M.D. (Tennessee, 1969), Thomas M. Daniel, M.D. (Virginia, 1964), Roger W. Davis, M.D. (Utah, 1968), Robert H. Jones, M.D. (Johns Hopkins, 1965), Paul H. Lange, M.D. (Washington Univ., 1967), Kenneth P. Ramming, M.D. (Duke, 1965), Bradley M. Rodgers, M.D. (Johns Hopkins, 1966), John W. Yarbrough, M.D. (Bowman Gray, 1967).

Junior Assistant Residents: Robert P. Barnes, M.D. (Duke, 1971), Ralph R. Bollinger, M.D. (Tulane, 1970), Glenn R. Carwell, M.D. (Vanderbilt, 1970), Larry P. Conrad, M.D. (Bowman Gray, 1969), Morton J. Cowan, M.D. (Pennsylvania, 1970), William C. DeVries, M.D. (Utah, 1970), J. Ollie Edmunds, M.D. (Florida, 1967), John R. Emmett, M.D. (George Washington, 1970), Robert W. Gilmore, M.D. (Duke, 1970), John T. Gwynne, M.D. (Duke, 1970), Lynn H. Harrison, Jr., M.D. (Oklahoma, 1970), John A. Holland, M.D. (Hahnemann Med. Coll., 1966), Lynn A. Hughes, M.D. (Oklahoma, 1969), Gregory A. Kelly, M.D. (Duke, 1970), William J. Robb, Jr., M.D. (Iowa, 1970), Randolph R. Smith, M.D. (Georgia, 1970), Frank R. Warder, M.D. (South Carolina, 1968), Kenneth E. Wood, M.D. (Florida, 1970).

Interns: John C. Alexander, Jr., M.D. (Duke, 1972), Michael J. Andrews, Jr., M.D.

(Duke, 1972), Charles C. Duncan, Jr., M.D. (Duke, 1972), James S. Fulghum, III, M.D. (UNC, 1971), William B. Goodman, M.D. (Duke, 1972), Richard O. Gregory, M.D. (Indiana, 1971), Walter R. Howe, M.D. (Yale, 1971), Richard D. Kunske, M.D. (Northwestern, 1971), William A. Lambeth, III, M.D. (UNC, 1971), Earl W. Mabry, M.D. (Oklahoma, 1971), Stephen A. Mills, M.D. (McGill Univ., 1971), John I. Moseley, M.D. (Univ. of Washington, 1971), Todd B. Orvald, M.D. (Jefferson, 1971), Steves Ring, M.D. (Harvard, 1971), Norman A. Silverman, M.D. (Boston Univ., 1971), Bruce M. Smith, M.D. (Harvard, 1971), Lewis H. Stocks, III, M.D. (Marquette, 1971), George C. Venters, M.D. (UNC, 1971), David K. Wellman, M.D. (Duke, 1972).

DIVISION OF NEUROSURGERY

Instructors and Chief Residents: Richard S. Kramer, M.D. (Duke, 1962), Emil L. Weber, M.D. (Indiana, 1964).

Fellow: Nelson L. Levy, M.D. (Columbia, 1967).

Assistant Residents: Stephen C. Boone, M.D. (Duke, 1965), John R. Leonard, III, M.D. (UNC, 1970), Stephen C. Robinson, M.D. (Duke, 1967), Selvadurai Sivalingam, M.D. (Singapore, 1965), Robert F. Wilfong, M.D. (Duke, 1967), David S. Zorub, M.D. (Tulane, 1970).

DIVISION OF ORAL SURGERY

Instructor and Chief Resident: Henry Tarrasch, D.D.S. (Washington, 1966).

Assistant Resident: Scott C. Tolbert, D.D.S. (Columbia Univ., 1970).

Intern: Howard E. Mallett, D.D.S. (West Virginia, 1967).

DIVISION OF ORTHOPAEDIC SURGERY

Instructors and Chief Residents: Glen A. Barden, M.D. (Emory, 1964), James R. Boatright, M.D. (Washington Univ., 1966), Milton B. Lambert, M.D. (Wisconsin, 1964), Charles J. Niemeyer, M.D. (Duke, 1966), Wayne B. Venters, M.D. (UNC, 1964).

Fellow: Panayiotis Soucacos, M.D. (Univ. of Athens, 1965).

Assistant Residents: James P. Aplington, M.D. (Johns Hopkins, 1966), William A. Bailey, M.D. (Kansas, 1966), Armando Bendana, M.D. (Univ. of San Carlos, 1969), Donald S. Bright, M.D. (Univ. of Maryland, 1967), William A. Carr, M.D. (Duke, 1966), Hiroshi Eguro, M.D. (Yokahama Univ., 1962), Mark S. Feierstein, M.D. (State Univ. of New York, Downstate, 1969), Lamar L. Fleming, M.D. (Georgia, 1965), Robert W. Gaines, M.D. (Duke, 1967), Neil E. Green, M.D. (Albany Med. Coll., 1968), Charles L. Ham, M.D. (Oklahoma, 1967), John M. Harrelson, M.D. (Duke, 1964), W. Richard Hooper, M.D., (Bowman Gray, 1967), Jay E. Hopkins, M.D. (Duke, 1968), Philip K. Keats, M.D. (Duke, 1969), Donald E. Mitchell, M.D. (Tennessee, 1966), Rodney A. Mortenson, M.D. (Southern California, 1967), Larry M. Nau, M.D. (Oklahoma, 1968), Mitchel C. Newman, M.D. (Louisville, 1968), James A. Pressly, M.D. (UNC, 1966), Wendelin W. Schaefer, M.D. (Marquette, 1964), A. Karim A. Al Shaikhly, M.D. (Univ. of Bagdad, 1964), Harold L. Spencer, M.D. (Indiana, 1964), J. Yan Stasikowski, M.D. (Duke, 1968), Richard K. Straley, M.D. (Pennsylvania, 1966), Veda N. Thakur, M.D. (Darbhanga Med. Coll., India, 1963), Garron G. Weiker, M.D. (Michigan, 1966).

DIVISION OF OTOLARYNGOLOGY

Instructors and Chief Residents: Robert F. Gomez, M.D. (McGill, 1969), Jack D. Williams, M.D. (Duke, 1965).

Fellow: Raci Kabakci, M.D. (Istanbul, 1959).

Assistant Residents: James T. Lowe, Jr., M.D. (Georgia, 1965), Patrick W. Kosmicki, M.D. (Creighton, 1965), Toby S. Morgan, M.D. (Georgia, 1967), David J. Steinbauer, M.D. (Maryland, 1966), Joseph P. Zaepfel, M.D. (Duke, 1965).

DIVISION OF PLASTIC AND MAXILLOFACIAL SURGERY

Instructors and Chief Residents: Glenn H. Shepard, M.D. (Virginia, 1962), Norman Cole, M.D. (Loma Linda, 1962).

Assistant Residents: Henry W. Neale, M.D. (Med. Coll. Virginia, 1964), Donald Serafin, M.D. (Duke, 1964), Joseph M. Still, M.D. (Georgia, 1965), Lisle Wayne, M.D. (Tennessee, 1962).

DIVISION OF UROLOGIC SURGERY

Instructors and Chief Residents: James M. Eaton, M.D. (Emory, 1961), Edmond T. Gonzales, M.D. (Tulane, 1965), Bruce A. Lucas, M.D. (Duke, 1965), Edgar J. Sanford, M.D. (Duke, 1965).

Assistant Residents: Nicholas M. Bath, Jr., M.D. (Duke, 1967), George D. Case, M.D. (Northwestern, 1969), D. Patrick Currie, M.D. (Duke, 1966), Arthur E. Fetzner, M.D. (Cornell, 1967), John M. H. Hart, M.D. (Duke, 1968), Lloyd J. Peterson, M.D. (Northwestern, 1969), Peter S. Stevens, M.D. (Emory, 1967), John L. Weinerth, M.D. (Harvard, 1967), W. Thomas Woodard, M.D. (Duke, 1967).

ROSTER OF MEDICAL STUDENTS

Class of 1975

Agner, Roy Christopher (Lenoir Rhyne), Cornelius, North Carolina
Allison, James Richard, III (Davidson), Columbia, South Carolina
Andrew, Louise Briggs (Duke), Durham, North Carolina
Area, Leandro Crescencio (William and Mary), Miami, Florida
*Armfield, Ben Wade (Dartmouth), High Point, North Carolina
Arnold, Luther Christian (Duke), Burlington, North Carolina
Austin, Robert Marshall (Lafayette), Westfield, New Jersey
Baker, Elizabeth Renwick (Duke), Newberry, South Carolina
Ball, Robert Morris (Georgia Institute of Technology), Dallas, Texas
Barnes, Larry (U.N.C. at Chapel Hill), Robersonville, North Carolina
Beardsley, George Peter (Princeton), Old Lyme, Connecticut
Becker, Matthew Joseph (Massachusetts Institute of Technology), N. Miami Beach, Florida
Bolander, Franklyn Francis, Jr. (Armstrong State), Savannah, Georgia
Bonin, Andrew Anthony (Pomona), Encino, California
Bonner, Ernest Lincoln, Jr. (Duke), Gaffney, South Carolina
Borowitz, Michael Joseph (Massachusetts Institute of Technology), Bronx, New York
Bousquet, Franklyn Philip, III (Dartmouth), Savannah, Georgia
Boyd, James Francis (Citadel), Newberry, South Carolina
Brady, Charles Eldon, Jr. (U.N.C. at Chapel Hill), Robbins, North Carolina
Brown, Joan Sandy (Shaw), Brooklyn, New York
Burwell, John Cole, III (USAF Academy), Greensboro, North Carolina
Butler, Stephen Robert (U.N.C. at Chapel Hill), Roseboro, North Carolina
Campbell, William Keith (State Univ. of New York at Buffalo), Williamsville, New York
Cappello, Roger William (Williams), Glens Falls, New York
Chambers, John Willis, Jr. (Princeton), Richmond, Virginia
Clayton, Linda Ann (North Carolina Central), Timberlake, North Carolina
Clegg, Herbert William, II (Davidson), Cockeysville, Maryland
Coleman, Arnette (Livingstone), Norlina, North Carolina
Cordingley, Gary Edward (Purdue), Crown Point, Indiana
Davis, Alan Dean (Emory), Knoxville, Tennessee
Donohue, Hugh James, Jr. (United States Military Academy), Rockville Centre, New York
Dorminy, John Henry, III (Emory), Fitzgerald, Georgia
Draffin, Richard Marion (Duke), Columbia, South Carolina
Drake, Robert Eldon, Jr. (Princeton), Winter Park, Florida
Durham, David Allen (U.N.C. at Chapel Hill), Charlotte, North Carolina
Eiden, Joseph John, Jr. (Duke), Wilmington, North Carolina
Faeder, Isabelle Richmond (Cornell University), Durham, North Carolina
Fields, Richard Alan (Hampton Institute), Greensboro, North Carolina
Forciea, Mary Ann (Marquette), Milwaukee, Wisconsin
Fortune, John Bradley (Duke), Indianapolis, Indiana
Fouts, Anthony Calhoun (University of Virginia), Atlanta, Georgia
Fries, Louis Frederick, III (Johns Hopkins), Wayne, Pennsylvania
Fromer, Carl (Columbia), St. Croix, U. S. Virgin Islands
Gober, Henry Fred, Jr. (Duke), Atlanta, Georgia
Goodkind, David Jay (State University of New York at Buffalo), Roslyn, New York
Graham, Suzanne Carol (Cornell), Chapel Hill, North Carolina
Gross, Wendy Elise (Hofstra), N. Bellmore, New York
Harvey, Robert Clinton (United States Military Academy), Pebble Beach, California

*Leave of Absence.

Hawley, Philip Caldwell (Princeton), Columbus, Ohio
 Hess, David Stephen (University of Florida), Douglasville, Georgia
 Holshouser, Jo Ann (Duke), Rockwell, North Carolina
 Humphrey, John Edward, Jr. (Georgia Institute of Technology), Sparta, Georgia
 Jarvis, Stuart Craig (Vanderbilt), Louisville, Kentucky
 Jenkins, Susan Wray (U.N.C. at Chapel Hill), Durham, North Carolina
 Jobin, Michael John (Harvard), Somerville, New Jersey
 Johnston, William Elliott (Duke), Jackson, Mississippi
 Joiner, Clinton Hubert (Georgia Institute of Technology), Decatur, Georgia
 Josephs, Shelby Harold (University of Pennsylvania), Baltimore, Maryland
 Kahn, Robert Ira (Cornell), Newburgh, New York
 Kapsch, Donald Norman (Princeton), Boca Raton, Florida
 Kehne, Barbara Joanne (Mount Holyoke), Hagerstown, Maryland
 Kessler, Allen Reif, II (Davidson), Jeffersonton, Kentucky
 Khoury, Christopher Paul (Yale), Oklahoma City, Oklahoma
 Kleinerman, Eugenie Sue (Washington), Shaker Heights, Ohio
 Lang, Laurence Alan (Univ. of California at Los Angeles), North Hollywood, California
 Larson, Richard Martin (Cornell), Laurel Bay, South Carolina
 Lhotsky, Dora Maratka (Duke), Durham, North Carolina
 Lober, Clifford Warren (Columbia), Falls Church, Virginia
 MacIntosh, Victor Henry (Duke), Chapel Hill, North Carolina
 Manners, Richard Eugene (Duke), Durham, North Carolina
 Marlow, Michele (Emory), Chipley, Florida
 McCarley, Dean Latain (Northwestern), Sarasota, Florida
 McCarty, Gale Anne (Duke), Durham, North Carolina
 McCloud, William (North Carolina Central), Charlotte, North Carolina
 Miller, Michael David (Michigan), Cheverly, Maryland
 Moore, Benjamin Edgar (Davidson), Columbia, South Carolina
 Moore, Reginald Graham, Jr. (United States Military Academy), Durham, North Carolina
 Muller, Thomas Walter (Massachusetts Institute of Technology), Richmond, Virginia
 Novak, Robert William (Brown), Berea, Ohio
 Ose, Dennis Eugene (Purdue), Indianapolis, Indiana
 Paulson, Jerome Avrom (University of Maryland), Baltimore, Maryland
 Peksa, Pamela Eileen (University of Maryland), Simpsonville, Maryland
 Pfister, William Charles (Duke), Monroe, North Carolina
 Phillips, Harry Rissler, III (Washington and Lee), Spartanburg, South Carolina
 Poeschel, Bernard Bruce (Wisconsin State University), Durand, Wisconsin
 Poston, William Mason (U.N.C. at Chapel Hill), Mooresville, North Carolina
 Priour, Harlan Lary (Duke), Ingram, Texas
 Reid, Barbara Sue (Rice), Shreveport, Louisiana
 Rhoads, Edward John (Duke), Durham, North Carolina
 Richardson, Cynthia (Bennett), Greensboro, North Carolina
 Richardson, David Lee (U.N.C. at Chapel Hill), Laurinburg, North Carolina
 Robinson, Charles Hall, Jr. (Princeton), Elizabeth City, North Carolina
 Rockson, Stanley Glenn (Duke), Miami Beach, Florida
 Schenk, Worthington George, III (University of Rochester), Kenmore, New York
 Simpson, John Bush (University of Texas), Houston, Texas
 Singer, Francis Philip Graham (Duke), Ft. Lauderdale, Florida
 Singletary, William Vance, Jr. (Duke), Durham, North Carolina
 Snyder, David Warren (Princeton), Metairie, Louisiana
 Stansbury, Stephen Williams (Johns Hopkins), Louisville, Kentucky
 Steele, John Carson Hay, Jr. (Duke), N. Augusta, South Carolina
 Stoughton, Ned Stanley (Univ. of California), Berkeley, California
 Stubbs, Thomas Mangum (Princeton), Durham, North Carolina
 Tatum, Arthur Howard (University of Wisconsin), Harrington, New Jersey
 Tift, Jerome Pound (Vanderbilt), Macon, Georgia
 Toher, Raymond Joseph, Jr. (Duke), Spartanburg, South Carolina
 Westby, Steven Ray (Duke), Madison, Minnesota
 Wilkerson, Stephen Young (King), Portsmouth, Virginia
 Williams, Lewis Thomas (Rice), Toccoa, Georgia
 Williams, Linda Rankin (North Carolina A & T State), Greensboro, North Carolina
 Wojeski, William Victor (Massachusetts Institute of Technology), Erie, Pennsylvania
 Zaino, Richard John (Holy Cross), Scotch Plains, New Jersey

Class of 1974

Abernethy, John Lloyd (Duke), Charlotte, North Carolina
Africa, Bruce Beyer (California), Watertown, Massachusetts
Alexander, Leon George, Jr. (Virginia), Gastonia, North Carolina
Allister, Daphne Barbara (Pomona), Escondido, California
Baber, Collins Earl (North Carolina Central Univ.), Durham, North Carolina
Barham, James Eldred (South Carolina), Columbia, South Carolina
Bateman, Alan Lawrence (Columbia), New York, New York
Berry, William Rosser (Davidson), Raleigh, North Carolina
Blumhagen, Dan William (Michigan State), Lansing, Michigan
Board, Robert Jeffrey (Duke), Front Royal, Virginia
Brantley, Bert Alton, Jr. (Duke), Columbia, South Carolina
Broders, Albert Compton, III (Texas), Temple, Texas
Brownlee, Michael Alan (Swarthmore), Rice Lake, Wisconsin
Burge, Joseph John (Temple), Shenandoah, Pennsylvania
Call, Newel Branson (Harvard), Portland, Oregon
Carmichael, Ann Gayton (DePauw), Roanoke, Va.
Casagrande, Sandra Maas (Boston), Belmont, Massachusetts
Cassell, Robert Holland (Harvard), Atlanta, Georgia
Chernys, Ann Ester (Cornell), Poughkeepsie, New York
Cohen, Mitchell Lewis (Duke), Greensboro, North Carolina
Cole, Steven Arnold (Harvard), Rockville Centre, New York
Curl, Walton Wright (U.S. Military Academy), Littleton, Colorado
Cutler, Daniel Joshua (Harvard), Bangor, Maine
David, Richard Joseph (Dartmouth), Jacksonville, Florida
Denton, Jimmie Gwyn (UNC), Washington, North Carolina
Dorsey, James Stonewall (Duke), Cheraw, South Carolina
Downs, Robert Woodward, Jr. (Duke), Greenville, South Carolina
Drawbaugh, Edward John (Maryland), Hagerstown, Maryland
Drysdale, Daniel Brian (Princeton), St. Augustine, Florida
Findlay, William Allan (MIT), Charlotte, North Carolina
Fisher, William Sloan, III (Davidson), Winston-Salem, North Carolina
Flowers, John Buchanan (Davidson), Richmond, Virginia
Foster, William Leicester (UNC), Roanoke, Virginia
Garrett, William Elwood, Jr. (UNC), Roxboro, North Carolina
Garson, Arthur, Jr. (Princeton), New York, New York
Georgiade, Gregory Stephen (UNC), Durham, North Carolina
Gilbert, Robert Woodrow, Jr. (Emory), Elko, Georgia
Gipson, Thomas G. (Johns Hopkins), Mechanicsburg, Pennsylvania
Goellner, William Edward (Michigan State), Lansing, Michigan
Goldner, Richard Douglas (Duke), Durham, North Carolina
Goodenberger, Daniel (Nebraska), Lincoln, Nebraska
Grulke, David Carl (Ohio State), Berea, Ohio
Holton, Walter Leggett (Wake Forest), Edenton, North Carolina
Hopkins, Richard Alan (Duke), Durham, North Carolina
Jason, Casey John (Northwestern), Glenview, Illinois
Jones, Lanning Derryl (Duke), Durham, North Carolina
Keel, James Franklin, III (Duke), Hockessin, Delaware
Koman, Louis Andrew (Duke), Winchester, Virginia
Kopelman, Richard Ira (Harvard), Natick, Massachusetts
Leppert, Phyllis Carolyn (Columbia), Ridgewood, New Jersey
Lester, Robert Martin (Princeton), Great Neck, New York
Lillydahl, William Conrad (Princeton), Millwaukee, Wisconsin
Lister, Eric David (Haverford), Baltimore, Maryland
Lloyd, Stephen Carroll (Johns Hopkins), Baltimore, Maryland
McDonald, John Alexander (Rice), Lakeland, Florida
Medlin, Douglas Anthony (St. Louis), Louisville, Kentucky
Miller, David Edward (Duke), Hillsborough, North Carolina
Mold, James William (Michigan), Durham, North Carolina
Nadas, John Adalbert (Case Western Reserve), Lakewood, Ohio
Nadel, Andrew Thomas (Columbia), New York, New York
Neuman, Walter Joseph (Duke), Clinton, North Carolina

Paris, Steven Andrew (Harvard), Roslindale, Massachusetts
 Pass, Harvey Ira (Johns Hopkins), Baltimore, Maryland
 Perry, John Christopher (Dartmouth), Fayetteville, New York
 Pierce, Ingrid Jean (Smith), Hillsborough, North Carolina
 Plumb, Vance John (Hampden Sydney), Richmond, Virginia
 Porter, Wayne Randolph (MIT), Boston, Massachusetts
 Powell, Norborne Berkeley (Stanford), Houston, Texas
 Pyles, Jerald Dennis (Georgetown), Temple Hills, Maryland
 Rainey, Thomas Gilman (Duke), Chevy Chase, Maryland
 Rosenthal, John Thomas (Johns Hopkins), Norfolk, Virginia
 Rothstein, Manfred Sheldon (Johns Hopkins), Owings Mills, Maryland
 Sanfilippo, Alfred Paul (Pennsylvania), Malba, New York
 Sateia, Michael John (Dartmouth), Jacksonville, Florida
 Schocken, Douglas David (Duke), McLean, Virginia
 Schwartz, Jared Naphtali (Ohio State), Youngstown, Ohio
 Schwartz, Marcia Freed (Duke), Philadelphia, Pennsylvania
 Scott, John Glenn (Duke), Tillar, Arkansas
 Shipley, Michael Burgess (Oklahoma City), Oklahoma City, Oklahoma
 Simrel, Kermit Oscar, Jr. (Howard), High Point, North Carolina
 Skarin, Robert Mark (Earlham), Arlington, Virginia
 Spector, Arthur George (Duke), Falls Church, Virginia
 Spray, Thomas Laton (Haverford), Oak Ridge, Tennessee
 Stead, William Wallace (Duke), Durham, North Carolina
 Strohmeier, Gerald Lynn (Kansas), Seneca, Kansas
 Stulting, Robert Doyle, Jr. (Duke), Knoxville, Tennessee
 Tager, Mark Jeffrey (Duke), Merrick, New York
 Teutsch, Steven Michael (Harvard), Salt Lake City, Utah
 Thistlethwaite, James Richard (Amherst), Washington, District of Columbia
 Thompson, Charlotte Ann (William & Mary), Marion, Virginia
 Todd, Robert Franklin, III (Duke), Granville, Ohio
 Tokarski, Edward (New York Univ.), New York, New York
 Troxler, David Hays (Davidson), Salisbury, North Carolina
 Walters, David Lee (Duke), Roanoke, Virginia
 Waugaman, Richard Merle (Princeton), Signal Mountain, Tennessee
 Weeks, Kenneth Durham, Jr. (Davidson), Rocky Mount, North Carolina
 Wiley, Jerry William (Livingstone), East Spencer, North Carolina
 Williams, Eddie Meek, III (Duke), Columbia, South Carolina
 Williams, Robert Sanders (Princeton), Athens, Georgia
 Wolff, Bruce Giles (Davidson), Columbus, Georgia
 Yancey, Michael Victor (Harvard), Atlanta, Georgia
 Zellinger, Michael Jay (Duke), Canton, Ohio

Class of 1973

Ahmann, Gerald Black (Duke), St. Charles, Missouri
 Andrew, Clifford George (Columbia), Florissant, Missouri
 Auerbach, Burt Jeffrey (Rutgers), North Plainfield, New Jersey
 Benbow, John Miller (Davidson), Statesville, North Carolina
 Bermanzohn, Paul Carl (City College of New York), Bronx, New York
 Cahill, James David, Jr. (Duke), Charlotte, North Carolina
 Carnavale, Nicholas Theodore (Arizona), Tucson, Arizona
 Chatterton, Howard Treat (Harvard), Denver, Colorado
 Cole, Thomas Carroll, Jr. (Texas), Huntsville, Texas
 Collins, Donald John (MIT), Minneapolis, Minnesota
 Conley, Martin James, Jr. (Princeton), Ft. Lauderdale, Florida
 D'Angelo, Lawrence James (Harvard), Southington, Connecticut
 Davis, Pamela Bowes (Smith), Huntington, New York
 Ducore, Jonathan Mark (Rutgers), Elberon, New Jersey
 Durham, George Homer, II (Harvard), Durham, North Carolina
 Edwards, Keith Robert (Williams), Lake Forest, Illinois
 Eisenbarth, George Stephen (Columbia), Oxford, North Carolina
 Ellett, James Wiley (Duke), Wilmington, Delaware
 English, Peter Calvin (Duke), Durham, North Carolina

Flickinger, Edward Garner (UNC), Lima, Ohio
 Frost, Richard Baylin (Wesleyan), Glenn Falls, New York
 Gnepp, Douglas Robbin (Drexel Inst. of Tech.), Philadelphia, Pennsylvania
 Gordon, Richard Evans (Duke), Washington, District of Columbia
 Goscin, Stephen Andre (Princeton), Richardson, Texas
 Grandis, Arnold Stephen (Washington & Lee), Richmond, Virginia
 Grauerholz, John Edward (Duke), Durham, North Carolina
 Hallett, John William, Jr. (USAF Academy), Wheeling, West Virginia
 Hanes, John Chisman, Jr. (Brown), Durham, North Carolina
 Hardaker, William Thomas, Jr. (Pennsylvania), Chapel Hill, North Carolina
 Hartley, David Paul (New Coll.), Wheatland, Wyoming
 Hartwig, Geoffrey Bryan (Southern Miss.), Hattiesburg, Mississippi
 Hibler, Thomas Decatur, Jr. (Duke), Durham, North Carolina
 High, William Lank (Duke), Boone, North Carolina
 Joyner, Ronald Wayne (UNC), Durham, North Carolina
 Kahler, Stephen Gregory (Princeton), Los Angeles, California
 Karp, Daniel David (Harvard), Mattapan, Massachusetts
 Kessler, Dale Leroy (Dartmouth), Durham, North Carolina
 Kidd, John Graydon, Jr. (Virginia), Bronxville, New York
 Kline, Lanning Bernard (Alberta), Edmonton, Alberta, Canada
 Krause, Robert Allen (Penn. State), Durham, North Carolina
 Lawrason, Peter Douglas (Kenyon), Haverford, Pennsylvania
 Leonard, Stephen David (Oberlin), Kew Gardens, New York
 Limbird, Thomas James (Wooster), Defiance, Ohio
 Lothman, Eric William (Duke), Kirkwood, Missouri
 Lowell, Seth Hawksworth (Indiana), Bloomington, Indiana
 Maier, Ronald Vitt (Notre Dame), Shadyside, Ohio
 Marion, Jeremiah Richard, III (Duke), Winston-Salem, North Carolina
 Martin, Scott Addington (Clemson), Rock Hill, South Carolina
 Mason, David Hout, Jr. (Williams), Castle Point, New York
 Maulitz, Russel Charles (Imperial), Birmingham, Alabama
 McConaughy, Robert Schnoor (California at Berkeley), Redwood City, California
 McLean, George Wallace (UNC), Clinton, North Carolina
 McNeer, James Frederick (Hampden-Sydney), Huntington, West Virginia
 Miller, Donald Max (Florida State), Blountstown, Florida
 Miller, Joseph Matthew, Jr. (Johns Hopkins), Timonium, Maryland
 Miller, Robert David (Davidson), Chapel Hill, North Carolina
 Moss, Jonathan (Harvard), Belmont, Massachusetts
 Nagey, David Augustus (Purdue), Bloomfield Hills, Michigan
 Nathan, Michael Roland (Duke), Durham, North Carolina
 Newman, Glenn Edwin (Duke), Clinton, North Carolina
 Norris, David Albert (Johns Hopkins), Towson, Maryland
 Ost Dahl, Roger Harold (Duke), Wilmington, Delaware
 Pilot, Mitchell Charles (Jefferson Med. Coll.), Hammond, Indiana
 Pizzo, Salvatore Vincent (St. Joseph's), Philadelphia, Pennsylvania
 Powell, Robert Charles (Shimer), Largo, Florida
 Quinn, Dianne McDonald (UNC), Washington, District of Columbia
 Quinn, Graham Earl (Duke), Reston, Virginia
 Raizes, Gary Scott (Harvard), Mason City, Iowa
 Raugi, Gregory John (Brown), Atherton, California
 Rendall, John Lloyd, III (Harvard), Dellwood, Minnesota
 Robinson, Stuart Fleetwood (Pomona), Los Angeles, California
 Rosenblitt, Donald Lewis (Princeton), Flushing, New York
 Rothstein, Thomas Lane (George Washington), Arlington, Virginia
 Sanders, Lee (Swarthmore), Levittown, Pennsylvania
 Sarn, James Edward (U.S. Military Academy), Sea Girt, New Jersey
 Scherer, Charles King (Princeton), Delray, Florida
 Schiff, Richard Ivan (George Washington), Wheaton, Maryland
 Schroeder, Terry Milton (Davidson), Charlotte, North Carolina
 Schwartz, Martin Lerner (Pennsylvania), Philadelphia, Pennsylvania
 Shasby, Douglas Michael (Univ. of Texas Southwestern), Youngstown, Ohio
 Shaw, Dale Russell (Duke), Stewartstown, Pennsylvania
 Sides, Paul J. (Centre), Lancaster, Kentucky

Simon, Richard Henry (Michigan), Huntington Woods, Michigan
 Slade, Clement Lawrence (Davidson), Jacksonville, Florida
 Sneiderman, Charles Alan (Maryland), Wheaton, Maryland
 Solovieff, Gregory Vladimir (Columbia), Amityville, New York
 Spaulding, Jean Gaillard (Columbia), Durham, North Carolina
 Stevens, Richard Carter (Columbia), Schenectady, New York
 Strittmatter, Warren James (Dartmouth), Plainview, New York
 Sung, Chung-Shin (New York), New York, New York
 Talmadge, John Mills, Jr. (Dartmouth), Big Spring, Texas
 Taylor, Lloyd McCully, Jr. (Colorado), Durham, North Carolina
 Thomas, Cornelius Bullard, Jr. (Duke), Atlanta, Georgia
 Waite, Robert Sears (Duke), Atlanta, Georgia
 Walther, Philip John (Michigan State), Van Wert, Ohio
 Waterbor, Robert Bertram (Harvard), Fairless Hills, Pennsylvania
 Weiner, Richard David (Pennsylvania), Maitland, Florida
 Weisiger, Richard Atlee (Princeton), Potomac, Maryland
 Wesly, Robert Lawrence (Western Md.), Severna Park, Maryland
 Wiener, Stephen R. (Yale), Portland, Oregon
 Williams, William Harrison, III (Wake Forest), Rock Hill, South Carolina
 Wilson, Joanne Peebles (UNC), Raleigh, North Carolina
 Zwelling, Leonard Alan (Duke), North Bellmore, New York

Class of 1972

Alexander, John Charles (Duke), Rocky Mount, North Carolina
 Anderson, Dana Kimball (Duke), Glen Cove, New York
 Andrade, William George (Houston), Wichita Falls, Texas
 Andrews, Michael Joseph (Guilford), Greensboro, North Carolina
 Arvan, Glenn Douglas (Rochester), Scarsdale, New York
 Ball, John Robert (Emory), Auburn, Alabama
 Barco, Daniel Harris (Alleghany), Medina, Ohio
 Benson, Dudley Woodrow, Jr. (UNC), Shrewsbury, Massachusetts
 Bley, Donald Edward (Johns Hopkins), Takoma Park, Maryland
 Bornstein, Neal Gerald (Bowdoin), Swampscott, Massachusetts
 Brown, Samuel Burnett (Emory), Daisy, Tennessee
 Buckman, Robert Francis (New York Med. Coll.), Milford, Connecticut
 Butts, John Davis (Duke), Closter, New Jersey
 Butts, Nancy Tribley (Duke), Greenville, North Carolina
 Charney, James (Columbia), Hewlett, New York
 Childs, Robert William (Princeton), Morgantown, West Virginia
 Cohen, Lawrence Franklin (Dartmouth), Chevy Chase, Maryland
 Copeland, Dana Derward (Rice), Baton Rouge, Louisiana
 Corless, Joseph Michael (Georgetown), North Bergen, New Jersey
 Coulam, Craig Merrill (Utah), Salt Lake City, Utah
 Dalton, James David (Duke), Asheboro, North Carolina
 David, Clifford Baynes (Duke), Jacksonville, Florida
 Davis, Glenn Craig (Reed), Durham, North Carolina
 Drennan, Dale Clay (Pennsylvania), Barrington, Rhode Island
 Duncan, Charles Cecil (Vanderbilt), Durham, North Carolina
 Dyer, Allen Ralph (Brown), Newport, Maine
 Eckman, Laurie Nelson (Davidson), Houston, Texas
 Engel, Susan Jean (Duke), Durham, North Carolina
 Ewald, Thomas McConnell (West Virginia), New Martinsville, West Virginia
 Forth, David Stephens (Duke), Roanoke, Virginia
 Frey, James Lewis (Amherst), St. Louis, Missouri
 Garr, David Ross (Duke), Miami, Florida
 Goodman, William Bruce (Missouri), Kansas City, Missouri
 Gordon, Gene Stephen (Colgate), Queens, New York
 Gretes, John Constantine (Wake Forest), Norfolk, Virginia
 Hankey, Terry Lee (Wright State), Dayton, Ohio
 Hawkins, Hal Kenneth (Rice), Bartlesville, Oklahoma
 Haynes, James Hugh (Tennessee), Durham, North Carolina
 Herpel, John King (Williams), Wallingford, Pennsylvania

Hopkins, Elwood Wilbur, III (New Hampshire), Morrisville, North Carolina
 Hoverman, Isabel Vreeland (Duke), Princeton, New Jersey
 Jaffe, Charles J. (Johns Hopkins), Merion, Pennsylvania
 Jarrett, David Bernard (Rochester), Flushing, New York
 Jensen, Christian Edward (Univ. of Capetown), Leonardo, New Jersey
 Lake, Charles Raymond (Tulane), Shreveport, Louisiana
 Lane, John Weston (Georgia), Avondale Estates, Georgia
 Lawrence, John Elmore (UNC), Raleigh, North Carolina
 Leight, George Staples (Davidson), Winston-Salem, North Carolina
 Levitin, David Alan (Pittsburgh), New Haven, Connecticut
 Levitt, Morton Hill (Princeton), Brooklyn, New York
 Lewis, Mary Kendra (Duke), Swarthmore, Pennsylvania
 Love, James McLean (Williams), Lincolnton, North Carolina
 Luger, Alan Mark (Free University), Englewood, New Jersey
 Lundy, Edmund George (Yale), Durham, North Carolina
 Martin, Samuel Preston (Yale), Gainesville, Florida
 Mason, Janet (Mount Holyoke), Orange, New Jersey
 McCarty, Kenneth Scott (Duke), Durham, North Carolina
 McClure, Charles Gettys (Duke), Atlanta, Georgia
 McMahon, Edward Matthew (Williams), Fair Haven, New Jersey
 McRae, John Radford (Georgia Tech.), Augusta, Georgia
 Michel, Randall George (Duke), Glendora, California
 Migliori, John Gererd (Dartmouth), Trenton, New Jersey
 Miller, Clinton Frederick, III (Yale), Wilmington, Delaware
 Mittler, Brant Steven (Harvard), Corpus Christi, Texas
 New, William, Jr. (Stanford), Hillsborough, California
 Oakes, Walter Jerry (Missouri), DeSoto, Missouri
 Oelrich, William Lyle (Davidson), Sanford, North Carolina
 Pearlman, Mark Howard (Williams), Rochester, New York
 Pehlke, Donald Michael (Harvard), Pacific Palisades, California
 Rausch, Curt Norman (Yale), Angola, Indiana
 Rhodes, Glen Robert (Cornell), Queens, New York
 Rhodes, Marcia Kelemen (Mount Holyoke), West Long Branch, New Jersey
 Rixse, Robert Sheldon (Johns Hopkins), Alexandria, Virginia
 Robison, George Randolph (Florida), Orlando, Florida
 Ryan, Paul Frederic (Univ. of Amsterdam), Chestnut Hill, Massachusetts
 Schmidt, Philip McKenzie (USAF Academy), Durham, North Carolina
 Serwer, Gerald Arthur (Rice), Oklahoma City, Oklahoma
 Shangold, Mona Marlynn (Pennsylvania), Perth Amboy, New Jersey
 Shelburne, John Daniel (North Carolina), Raleigh, North Carolina
 Singal, Sarah Snell (Columbia), Rochester, New York
 Somers, William Alan (William & Mary), Lynchburg, Virginia
 Starr, John Walter (Emory), Albany, Georgia
 Taylor, Harvey Grant (U.S. Military Academy), Houston, Texas
 Thompson, James Willard (Med. Coll. of Georgia), Eatonton, Georgia
 Tschang, Tai Po (Southern Illinois), Shatin, NT, Hong Kong
 Watson, Donald Charles, Jr. (Stanford), Summit, New Jersey
 Welch, Nancy Mae (Lynchburg), Orlando, Florida
 Wellman, David Kenton (Duke), Huntington, West Virginia
 Wheeler, Clifton Cannady (Davidson), Durham, North Carolina
 Widness, John (Amherst), Lynnfield, Massachusetts
 Willis, John Kelter, II (Duke), Johnson City, Tennessee
 Wilson, Jeffrey Wellington (Duke), Pittsburgh, Pennsylvania
 Wittig, John Henry (State Univ. of New York at Buffalo), Buffalo, New York
 Woodhall, Philip Barnes (Georgia), Macon, Georgia

CLASS OF 1971 WITH INTERNSHIP APPOINTMENTS

Abraham, Gerald Michael (New York, New York), Doctor's Hospital, Washington, D. C.
 Alpert, Eric David (New Bedford, Mass.), Duke Medical Center, Durham, North Carolina
 Barnes, Robert Paul (Edmonds, Washington), Duke Medical Center, Durham, North Carolina
 Baten, Michael (Paterson, New Jersey), Duke Medical Center, Durham, North Carolina
 Beach, Roberta Kay (Winston-Salem, N. C.), Colorado Medical Center, Denver, Colorado

Behringer, Frederick Richard, Jr. (Baltimore, Md.), Wm. A. Shands Hospital, Gainesville, Florida

Belmaker, Elaine Z. (St. Louis, Mo.), Duke Medical Center, Durham, North Carolina

Belmaker, Robert Henry (N. Miami Beach, Fla.), Duke Medical Center, Durham, North Carolina

Beuttel, Stephen Charles (Pleasantville, New Jersey), Duke Medical Center, Durham, North Carolina

Boehm, Timothy Michael (Alexandria, Virginia), North Carolina Memorial Hospital, Chapel Hill, North Carolina

Boleman, Patricia Audrey (Largo, Florida), Ohio State University, Columbus, Ohio

Brater, Donald Craig (Oak Ridge, Tennessee), Duke Medical Center, Durham, North Carolina

Buckley, David Kennedy (Fort Lauderdale, Florida), Duke Medical Center, Durham, North Carolina

Buffington, Joseph Suttles (Lithonia, Georgia), Duke Medical Center, Durham, North Carolina

Cies, William Andrew (San Marino, California), Duke Medical Center, Durham, North Carolina

Cobbs, Walter Herbert, III (Princeton, New Jersey), Duke Medical Center, Durham, North Carolina

Colpitts, Michael Ralph (Maryville, Tennessee), Harborview Center, Seattle, Washington

Cox, Edwin Baggett (Nashville, Tennessee), Emory University Hospital-V.A., Atlanta, Georgia

Croker, Byron P., Jr. (Pittsburgh, Pennsylvania), Duke Medical Center, Durham, North Carolina

Curry, Robert Whitney, Jr. (Orlando, Florida), Stanford University Affiliated Hospitals, Stanford, California

Davis, Holly Wilson (Richmond, Virginia), Children's Hospital, Pittsburgh, Pennsylvania

Felsenfeld, Arnold Jay (N. Arlington, New Jersey), Duke Medical Center, Durham, North Carolina

Fichtelman, Jon Robert (Lake Worth, Florida), Univ. of Miami Affiliated Hospitals, Miami, Florida

Fischer, Kenneth Clyde (Brooklyn, New York), Univ. of Miami Affiliated Hospitals, Miami, Florida

Gilmore, Robert William (East Liverpool, Ohio), Duke Medical Center, Durham, North Carolina

Haliasos, Constantine Athan (Danville, Virginia), Duke Medical Center, Durham, North Carolina

Hoffman, Philip Guthrie (Houston, Texas), Duke Medical Center, Durham, North Carolina

Horne, McDonald Kelso, III (Memphis, Tennessee), Duke Medical Center, Durham, North Carolina

Horowitz, Alan Jay (Brooklyn, New York), Duke Medical Center, Durham, North Carolina

Hourigan, Philip A., Jr. (Bridgeport, Connecticut), Children's Hospital, Pittsburgh, Pennsylvania

Hoverman, John Russell (Seaford, New York), Albany Medical Center, Albany, New York

Hybarger, Charles Patrick (Beltsville, Maryland), H. C. Moffitt-Univ. of California, San Francisco, California

Johnson, Van Warren (St. James, Minnesota), Univ. of Pennsylvania Hosp., Philadelphia, Pennsylvania

Jones, Georgeanna Seegar (Baltimore, Md.), Colorado Medical Center, Denver, Colorado

Juk, Steven Stanley, Jr. (Georgetown, South Carolina), Univ. of Alabama Medical Center, Birmingham, Alabama

Kaufman, Michael David (Mahwah, New Jersey), New York Memorial Hospital, New York City, New York

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Map of the Medical Center

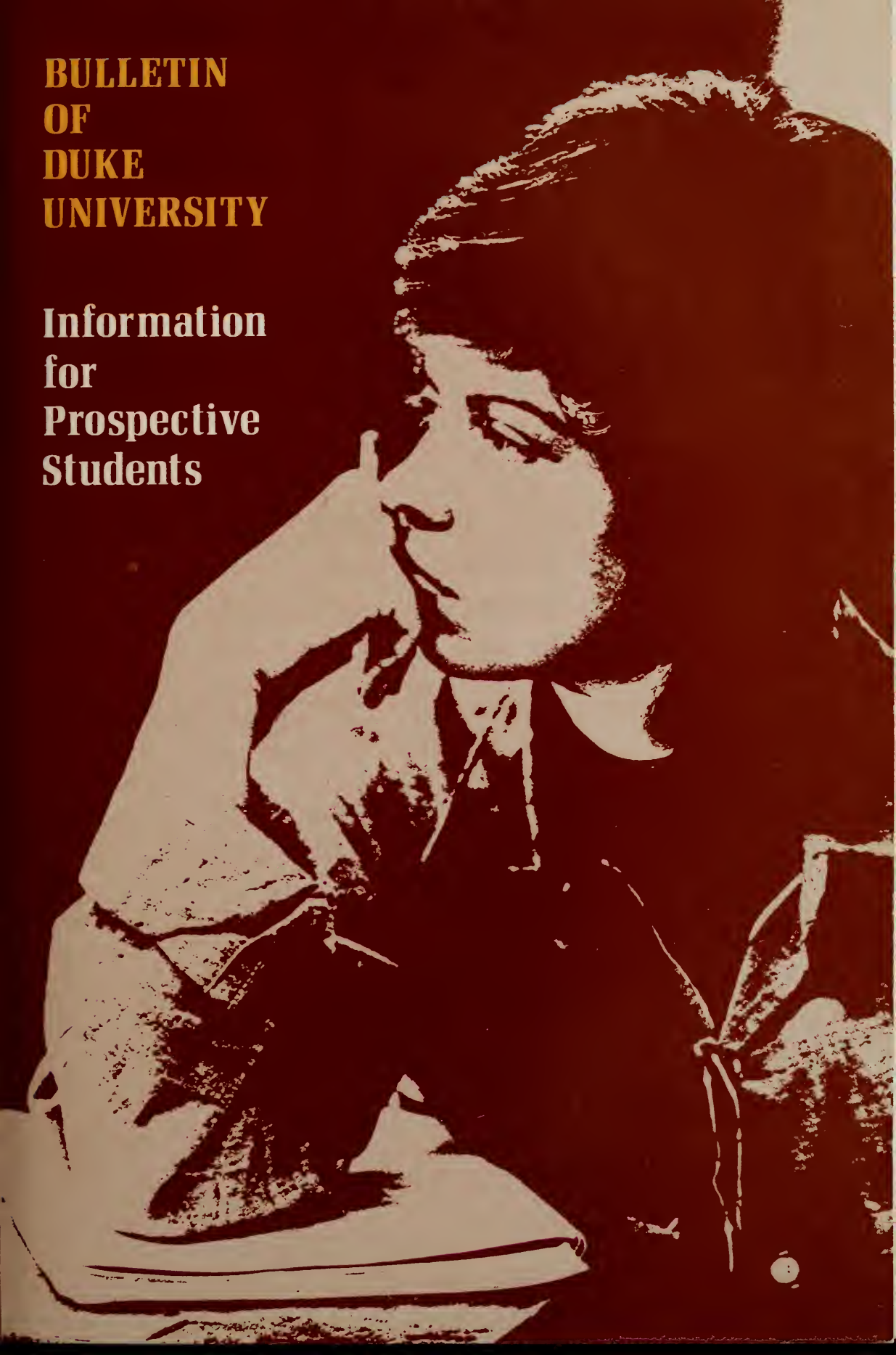


1. Gerontology
2. M & I No. 3
3. Clinical Research No. 1
4. Main Entrance Hospital
5. Clinical Research No. 2
6. Baker House
7. School of Medicine (Davison Building)
8. Duke Hospital
9. Bell Bldg.
10. Hanes Annex
11. Hanes House
12. Graduate Center
13. Medical Sciences Bldg. No. 1
14. Training Center Bldg. No. 1
15. Marshall Pickens Rehab. Cnt.
16. Training Center Bldg. No. 2
17. Research Park Bldg. No. 1
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22. 220 Anderson St.
23. Child Guidance Clinic
24. Vivarium
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26. 2013
27. Civitan Bldg.
28. M. C. Personnel Bldg.
29. Volatile Storage
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48. Medical Research Laboratories (Old Laundry)



BULLETIN OF DUKE UNIVERSITY

**Information
for
Prospective
Students**





BULLETIN OF DUKE UNIVERSITY

Information for Prospective Students

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Inside covers: Outdoor concert at
Wallace Wade Stadium.

No single bulletin can say all that needs to be said about this University, and for this reason, we've taken the liberty of quoting generously from other Duke publications (both administration-sponsored and student-sponsored). Among those we found the most helpful were a faculty-student evaluation of the small-group feature of the curriculum, a pamphlet entitled *Black Impressions of Duke University*, a YMCA-YWCA publication providing an alternate look at *The University Experience* for entering students, and, of course, the *Bulletin of Undergraduate Instruction*.

A number of individuals proved highly quotable. We particularly appreciate the thoughtful comments of a rising senior, Rob Melton, on the nature of involvement, and of the Director of Admissions, Dr. Robert H. Ballantyne, on the dynamics of admission.

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Why Think of College at All?

Why Duke?

by Reynolds Price

Why go on to college at all? Presumably, you're seventeen or eighteen years old. That means you have probably lived one-fourth of your life by now and are no longer pleading "Youth!" as an excuse for your errors or thoughtlessness. (You know who I mean—"I'm only eighteen; how was I supposed to know?" The answer is "Through your eyes and head; you've had twenty-five percent of your life to learn in.") So by now, you'll have asked yourself that question in many forms—why go to college?

The simplest answer—now, in America—is "Why not? My friends are going. It's the next thing to do. My parents want it. Future employers demand it. It's a temporary detour from Army, the Hard World, Jobs, Marriage (though I've heard college doubles as a marriage-broker). What else would I do?"—For one thing, you might do what most of the human race has done and still does long before age eighteen—leave home and begin your free life, for which you must work.

But of course there are far more serious answers. "I don't know enough yet—about the world, myself, others, least of all God—to want to begin my free life just now. If I tried, I'd have slim hopes of being free. I'd be bound and trapped by all I didn't know and, worst of all, by what I didn't know I didn't know. These four years of college are the time my society—like it or not, it's stronger than me and has the power to paralyze me in misery—has agreed to allow me for final preparations."

—Preparations for what? That's the next question and it goes down deeply.—For this "free life" I've mentioned, in the "real world"? You can't prophesy the life you're going to have, the world you'll meet; so how can you prepare for a succession of mysteries?—You have to guess

Reynolds Price, Duke alumnus in the Class of 1955, novelist and writer of short stories, is an associate professor of English. In 1962 his novel *A Long and Happy Life* won the William Faulkner Prize for a notable first work.





“—then, the place. Not so much the famous neo-Gothic and Georgian quads as the huge green setting. . . .”

at what those mysteries will be; and unless you're psychic, you can only begin to guess at the future by examining and understanding the past—your own, your race's, the past of the universe. And you have to guess at who will accompany you through your life—your parents part-way, your wife or husband, children, friends, colleagues, your unavoidable enemies. The only prior certainties are these—that you'll have your life (some sort of life) till the moment you die and that you yourself will be your one permanent inescapable companion through every moment until the last.

So I would suggest that the simplest, truest answer to “Why go to college?” is implied in the need to meet and deal with those two certainties. You go to college to continue your education—for the last years of your life which are likely to be free of heavy social burdens and therefore available to you as time in which to concentrate. You'll say I'm talking circles—what is “education”?

You know its etymology, from Latin—*e-ducere*, to lead out or draw out. But draw what out of what?—to draw yourself out of your physical and emotional childhood. To draw your own innate and acquired qualities of character and skill out of their confining fat of natural ignorance, laziness, self-destruction. To draw out of yourself, teachers, friends, and books the strengths you will need to live your life.

“Why bother?” you might say—“Most human beings have lived their lives with the barest minimum of formal education; most in fact with none at all.”

I'd say, “Right, and most lives have been miserable. You're going to have your life—unless you choose to stop it—so you'd better discover

"I mean formal education, conducted within an academic community, established however humanly and therefore imperfectly, maddeningly. . . ."



as soon as possible how to have it, what matters in it." Lord Salisbury, Victoria's prime minister, once said when asked if he didn't think it mattered greatly for someone to do thus and so—"Nothing matters very much and few things matter at all." The remark may shock you, as it still does me every time I hear it; but it says nothing new. It seems at first to share the weariness of Marcus Aurelius, the easy disillusionment of Ecclesiastes, the Rubaiyat and a billion adolescent diaries—Vanity of vanities, all is vanity. But that's not what Salisbury said (though he might, having presided for years over the largest empire in the history of the world)—not "All is vanity" or "Nothing matters" but "Nothing matters very much and few things matter at all."

What few things? I'd suggest that another bout of serious education is your last chance of finding out some of those things at least (and the ways to pursue them or live in their presence or absence if need be) before having to discover them all by the primeval and appallingly wasteful method of surprise and experience—life-between-the-eyes, with no fair warning and no advance knowledge of preventives or cures.

One of the things which will matter greatly, in your life and the lives of those close to you, is the work you choose to do. There's a lot of sneering and wincing lately at what's called the Puritan or Protestant Work Ethic; the ethic which, we're told "made America great"—"Work for the night is coming . . . The Devil finds work for idle hands . . . A man's work is his truest worship." In short, many young people now deride an ethic which has come to see virtue in busy-ness, whatever the nature or aim of the business, war or peace, good or bad. And no man of good sense would try to deny that the old Judeo-Christian ethic



"To draw your own innate and acquired qualities of character and skill out of their confining fat of natural ignorance, laziness, self-destruction. . . ."

has degenerated on many sides into the cynical, near-hysterical pursuit of money and power-for-the-sake-of-power. But to recognize decay in a concept is not to demand its abandonment, rather its repair—provided that the decay is not inherent in the concept itself, in some innate falsity or in its inappropriateness to present conditions. Work in the sense of daily effort at a job—work as labor—may be rapidly doomed for increasing numbers of men by automation, prosperity, governmental support. The fact remains however that we have our lives—say seventy years—and we have to get through them, some 25,690 days at twenty-four hours each, two-thirds of them conscious. And until medicine has developed far more sophisticated tranquilizers or methods of genetic manipulation or mind-control, we're going to have to find our own ways to pass, to endure, that time and the disciplines and techniques for passing it, if not usefully and happily at least harmlessly.

Until that day of universal leisure and the understanding of the uses of leisure, I'd suggest that your work can be your most reliable life-companion, your safest hope of freeing yourself.—Freeing yourself from what? First, from physical want—hunger, cold, disease. Then from other human beings, especially those you love. This is not to claim that you'd wish to abandon the duties of love toward your family and friends; it is to claim that only through your own early discovery of, cultivation of, some absorbing work—laying roads, exploring space, writing novels—will you have much chance to free yourself, not from love but from the crippling emotional dependence upon other human beings which poisons anyone who has nothing in his life upon which he can rely which promises to be more permanent than other people.

“ ‘I don’t know enough yet—about the world, myself, others, least of all God—to want to begin my free life just now. . . .’ ”



A craft, a skill can—given good health—last you all your life. Very few friends, wives, sons, daughters can prove as enduring however much they wish to. Then last, work can free you from yourself; for your self will remain true longest of all. All your weaknesses will court you to your grave; and only a daily commitment to some work which will demand from you full exercise of your strongest self can free you from them.

Then I’d suggest that a full definition of *education*—for now at least—might go like this: Education is the process by which a man or woman discovers, as early as possible in his brief life, the nature and duties of the work which he desires and needs and is fitted to do and the means of doing it.

Am I speaking of *formal* education?—the sixteen to nineteen years of school and college you’re likely to experience?—or, more broadly, of a private search and process conducted on your own? I mean *formal* education, conducted within an academic community, established however humanly and therefore imperfectly, maddeningly. Why so limiting?—Because not one man in fifty thousand has the resources of curiosity, concentration, self-control and stamina to lead himself, unassisted and unregulated, through the disciplines of even a minimal education.

If I assume that you’ve accompanied me this far, then I can hope that you won’t think I’m producing—with a sly *Ah-ha!*—a rabbit from my hat when I say that your next question might be, “Why think of Duke?” Presumably you’ve already asked the question or you wouldn’t be reading this pamphlet.

Leaving aside personal loyalties (that I was an undergraduate at



"Until that day of universal leisure and the understanding of the uses of leisure, I'd suggest that your work can be your most reliable life-companion, your safest hope of freeing yourself. . ."

Duke, that I returned to Duke to teach and have found it a good place for writing fiction), my first and also final answer would be—because Duke is almost certainly as good a university as you are a man or woman. By which I mean that, provided any special interest of yours is dealt with at Duke, its major resources will match your needs and abilities and will test your character and stamina, your determination to do serious work, to have a free and serious life.

—Not every resource now—apart from equipment, Duke consists of human beings (a loose collection of ten thousand students, faculty, administrators, staff); and you would be faced often with the fact that such an institution is subject at every turn to failures in the competence and character of each member. But where will you not be faced with that fact, that particular frustration?—in a smaller college? A smaller college consists of fewer people—that much is sure, if that's a comfort; most universities consist of tens of thousands more—but a smaller college also contains fewer of the resources in which Duke is well-stocked.

I'd suggest that the major resources of Duke—and your heaviest reasons for considering it—are these (and in this debatable order):

- a library whose two million books and four million manuscripts place it among the first eighteen university libraries in America.
- a curriculum providing great fluidity of individual speed, intensity and independence within the bounds of responsible good sense.
- a total faculty of more than one thousand, some five hundred of whom work with undergraduate students (a faculty-student ratio then of one to ten), a number of whom are distinguished scholars

“ . . . provided any special interest of yours is dealt with at Duke, its major resources will match your needs and abilities and will test your character and stamina, your determination to do serious work, to have a free and serious life. . . .”



and some of whom are well-known on campus (ask any student) for the excellence of their classroom efforts and their concern with serious student interests.

- an undergraduate student body of about five thousand which contains an unusually high and growing proportion of excellently informed men and women engaged in their own work.
- then, the place. Not so much the famous neo-Gothic and Georgian quads as the huge green setting. The campus is set in some eight thousand acres of thick pine forest, granite bluffs, creeks, rivers. Walk twenty minutes—or drive for five—and you’re deep in woods. Clear air, clean light, silence, animals, arrowheads. Unprettified wilderness, available to you. If that doesn’t seem a “major resource” for your education, you’d probably be happier at Columbia or N.Y.U. under blankets of soot.

There are many other assets—and liabilities—but my suggestion after more than fifteen years of exposure to the place, man and boy, is that if you are an American of undergraduate age who seriously wants to continue an education (as broadly defined above), who finds your special subject offered at Duke and is prepared to work within the general frame of a liberal curriculum at a private institution (which would imply that you have few delusions about the paradisaical nature of institutions or the ease of changing them), then you won’t find ten more possible places—more resourceful and better located for work. Make it five. Or eight—that’s only a game. The real question now, I’d think, is about you.

"—then, the place. Not so much the famous neo-Gothic and Georgian quads as the huge green setting. . . ."

The University

The "eight thousand acres of thick pine forest, granite bluffs, creeks, rivers" which provide the setting for Reynolds Price's essay rest in Durham, North Carolina, a growing city of almost 100,000 residents located approximately 250 miles south of Washington, D. C.

Gothic quadrangles on the University's West Campus are bounded on the one side by the Sarah P. Duke Gardens and on the other by a complex of modern laboratory facilities. University buildings and homes line the mile-long private drive leading to the East Campus, Georgian in its architecture and the site of early Trinity College. When James B. Duke granted his Indenture of Trust transforming college to university in 1924, coordinate liberal arts colleges for men and women were established on the West and East Campuses, and provision was made for programs in engineering and nursing. In September 1972, almost 50 years later, the two liberal arts colleges will merge, and three divisions will comprise the undergraduate student body—Trinity College of Arts and Sciences, the School of Engineering, and the School of Nursing. Frequent, free bus transportation brings together the





dormitories, libraries, dining facilities, and classroom buildings on both campuses and reinforces the unity of the two campuses.

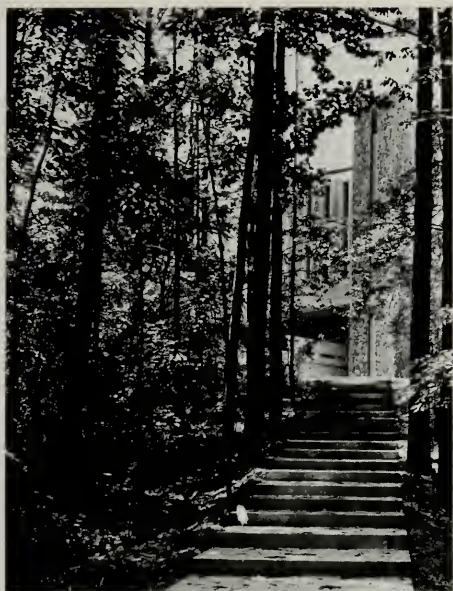
University resources bring direct and indirect benefits to campus and community alike. The Graduate School, the professional schools of Law, Medicine, Divinity, Forestry, and Business Administration, and an internationally known medical center have an impact that is felt far beyond the limits of the Duke campus.

- Primary among Duke's assets is a library collection which stands high among the most noteworthy in the nation. Two million volumes and four million manuscripts in open stack collections on both campuses assure the undergraduate and graduate student alike of source material of breadth and depth sufficient to further the most detailed research. Beyond the general facilities available to all students, however, the special needs of undergraduates are served by spacious and comfortable study areas with ready access to volumes reserved by professors for undergraduate courses, and a special browsing library expected to contain 50,000 volumes of general and contemporary interest. A

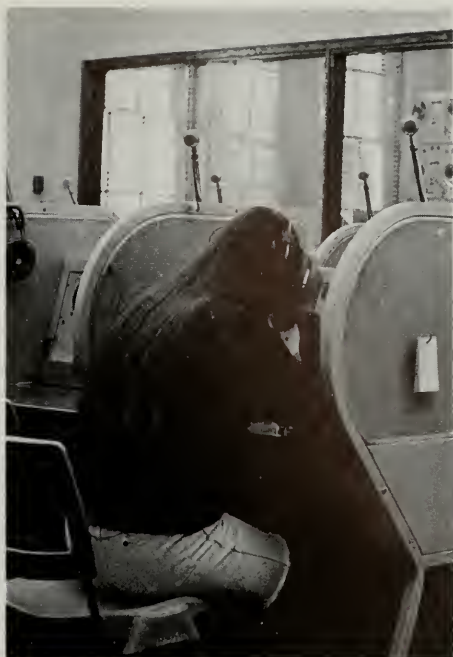
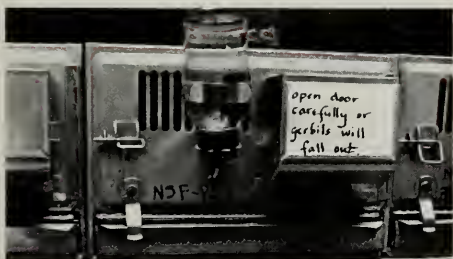
handsomely furnished Rare Book Room is the University's repository for its valuable collection of more than 30,000 rare books and manuscripts, including nearly all printed first editions of Frost, Byron, Whitman, and George Eliot. Through a reciprocal agreement, the libraries of the University of North Carolina, North Carolina Central University, and North Carolina State University are also open to Duke students.

- The modern Paul M. Gross Chemical Laboratory, believed to be the best equipped of its kind, further illustrates the University's efforts to enhance faculty and student research. A Regional Nuclear Structure Laboratory, one of the most advanced nuclear facilities in the nation, joins the two Van de Graaff accelerators already on the campus. The hyperbaric unit at the Duke University Medical Center is widely recognized for its use in the application of atmospheric pressure in experiments and delicate surgical procedures. A phytotron, one of two in the Southeast, allows duplication of environmental conditions anywhere in the world.

- Duke's long-term interest and involvement in marine science takes visible shape in its research facility at



"I was afraid that West Campus was considered Duke University, and East Campus, a little adjunct to it. But I think this has changed in the last couple years. They've come to be considered the same university."



"At a University like Duke, the word 'resources' means more than volumes in the library. There's too much going on around here for you to confine your horizons to an undergraduate course catalog. Even the most distant researcher can be a valuable resource—especially if you let him know you're interested in his work."



"Durham is neither small college town nor large metropolis, but it contains important elements of both. The wise student will make an effort to become a part of the phenomenal social and economic diversity that lies beyond the walls of the campus. There's ample ground here for real-world application of classroom principles."

Beaufort, North Carolina, the home of the University's fully equipped, 118-foot R/V *Eastward*, the first ship in the United States designed specifically for research in biological oceanography. An interdisciplinary spring semester program at Beaufort is available to undergraduates.

- A resource new to the University is the Institute for Policy Sciences and Public Affairs, which brings the experience of the University community to bear on the analysis of both existing public policies and the institutions which administer them. It serves as a framework in which students and faculty from many disciplines work together in problem-oriented research and teaching. An undergraduate major in Public Policy Studies is described in the section of this bulletin entitled Areas of Study.

- Organized research, of course, need not be limited to the laboratory. The Center for the Study of Aging and Human Development, the Rule of Law Research Center, and the Center for Commonwealth Studies are all active in research, publishing, and graduate education.

Whatever the discipline, undergraduates reaching advanced levels of

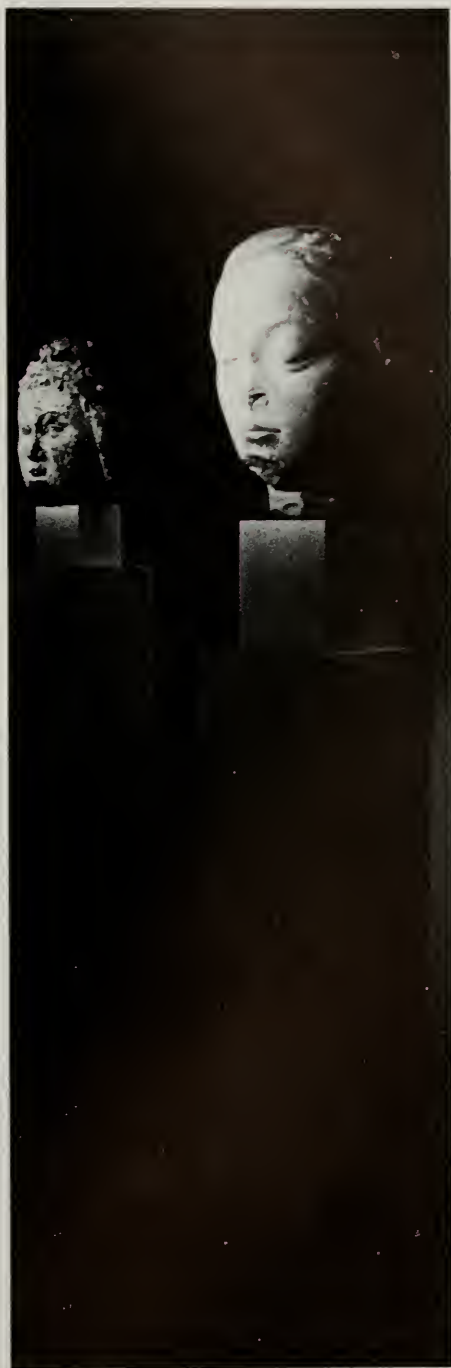


"I've finally come to realize that getting it together is a dynamic process. You don't just get it together and then quit. . . . If that's your game, you end up being un-hip, un-real, un-ready, and much, much un-together."

study enjoy faculty support and assistance in pursuing research involving the use of the most sophisticated facilities, thought by many to be solely within the realm of the graduate student.

- The Research Triangle, a term which for years has described the area delineated by Durham, Raleigh, and Chapel Hill, is also a unique foundation and institute which draws upon the resources both of private enterprise and of the three major area universities which make possible its existence. Work in the Research Triangle over the past ten years has embraced virtually all the technical and social disciplines, ranging from the establishment of a university and government consortium on air pollution control to the Triangle Universities Computation Center, one of the largest information processing centers of its kind in the United States.

- One of the new resources available to the Duke community is an art museum on the East Campus which houses the University's permanent collection as well as those on loan from individuals and museums around the world. It is perhaps best known for the Brummer collection, a treasure of





sculpture and decorative arts of the Middle Ages and Renaissance.

● Finally, the serenity and beauty of the Sarah P. Duke Gardens, spanning fifteen acres in the heart of the campus, provide year-round pleasure to visitors and members of the Duke community while serving the Botany Department as laboratories illustrating the types of plants indigenous to the area. An open, grassy expanse in the gardens is often a spot for open-air concerts, as well as for informal gatherings of students.

At the most fundamental level, however, it has always been the men and women—faculty and students—who have provided the University's greatest wealth. From its earliest beginnings as Brown's Schoolhouse in 1838 to the institution as we know it today, Duke University has drawn to its midst men and women of imagination, courage, and intellectual achievement.





"One of the biggest mistakes a new student can make is to form preconceptions of Southern 'grits' or Northern 'freaks' before he gets here. In other words, where people come from has relatively little bearing on who they are or what they're into—at Duke or anywhere else. Ideas to the contrary can only inhibit you in the development of meaningful relationships."



"I mean formal education, conducted within an academic community, established however humanly and therefore imperfectly, maddeningly. . . ."

Arts and Sciences

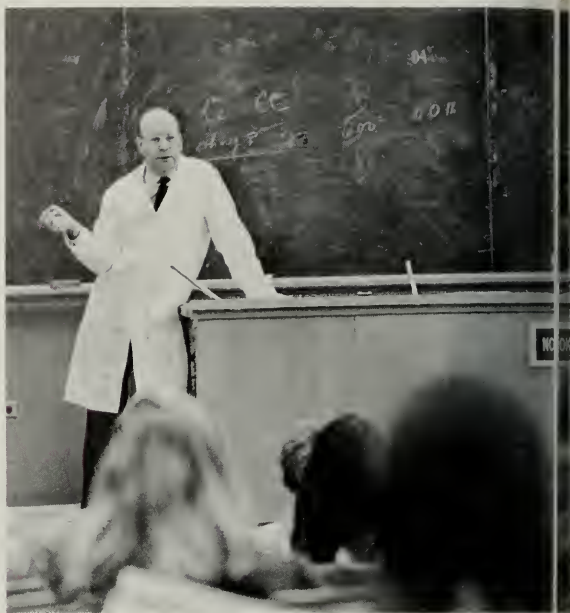
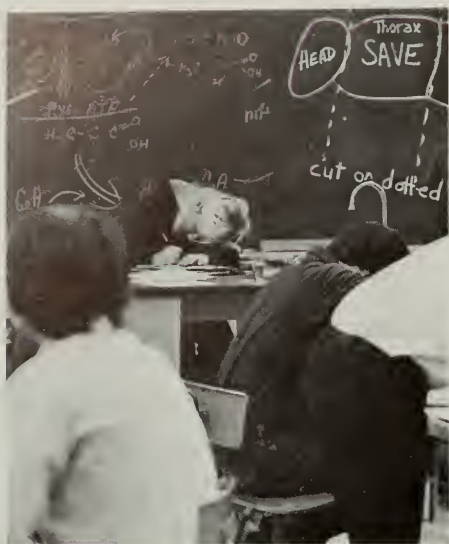
In the conviction that education is more the development of a stance toward life than a prescribed formula for the accumulation of knowledge, Duke University offers its undergraduates a variety of learning experiences to further their individual educational goals. A student may major in a single department or concentrate his work in several related departments. He may even seek acceptance into Program II and pursue a curriculum of his own devising. Whatever the option, the hallmark of the curriculum in arts and sciences is flexibility. There is no set formula which each Duke student must follow; he plans his own course of study, with the approval of his adviser, according to specified guidelines rather than specific course requirements.

These guidelines establish a framework which includes study in each of three main divisions: natural sciences and mathematics, humanities, and social sciences. In one division the student pursues the requirements for a major (usually eight or ten semester courses); in the second he selects at least four semester courses, two of which should take him to an advanced level of study; and in the third he undertakes at least two semester

The Curriculum



If you don't find the specific course that you want, lobby for it."



courses. Within this framework and beyond it, a total of 32 semester courses are completed according to the student's own talents and goals.

Some students may wish to undertake study in such interdisciplinary programs as Medieval and Renaissance Studies or Black Studies. Others hoping to relate work in two or more departments may seek departmental approval for a personal interdisciplinary program including at least three courses above the introductory level in each department. Students in the natural sciences have undertaken work in such areas as biology, biomathematics, microbiology, molecular biology, and oceanography. A course of study need not be declared until the second semester of the sophomore year.

A required one-semester course in English Composition may be waived for students who attain a score of at least 700 on the College Board English Composition Achievement Test. All undergraduates engage in two semesters of physical activity.

Small group learning experiences, ranging in size from one to fifteen students, supplement the format of regular classes. In seminars and tutorials and in class-connected discussion groups and preceptoria, freshmen

and sophomores are encouraged to engage in discussion, develop skill in thought and speech, and grow with the stimulation of challenging points of view.

With every student having had experience in these small groups during the first two years at Duke, it is expected that juniors and seniors will have developed the skill, assurance, and mental agility to contribute to the advanced seminars or undertake the extensive independent study which are part of the upper levels of study at Duke. In addition, sophomores, juniors, and seniors may take one elective course each semester on a pass-fail basis. Duke strongly encourages independent study for all students, the limits of which are determined by the student, his adviser, and the professor concerned. Whatever he chooses, no student can pass idly through the University on the back row an anonymous and shady figure appearing only in a grade book.

Program II exists for the student whose interests or talents are so highly refined that they cannot be satisfied even by the flexibility offered under Program I, the general arts and science curriculum. With the counsel and approval of a single department



and an interdepartmental University committee, the student entering Program II has the opportunity to formulate with his adviser a plan of work adapted to his own special needs. He and his adviser assess his background and ambitions and together evaluate the resources of the University and those outside it as a means of satisfying those ambitions. Once he is accepted into the program, the student is released from most of the academic requirements of the standard curriculum.

For one junior entering Program II, for example, the background was a major in English, a love of music, and a family heritage rooted in the dwindling culture of Appalachia. This student chose folklore and folk music as his full-time academic interest and undertook a study of the inroads made by the media on Appalachian culture. He proposed dividing his remaining three semesters into one semester of intensive course work in English, music, and anthropology (and a course in folklore at a nearby university), and two semesters of independent research. He received permission to extend his research first to the Folklore and Mythology Center at UCLA, and then to Washington, D. C. at the Library of

"The small group system negates the idea of being an alpha number and a face in the lecture group. I like the more personal relationship and deeper study of material."

"The readings were valuable, but the discussion usually digressed. The most interesting times were the professor's reminiscing about the Depression."

"Didn't expect to be studying so much."





"Religion 101. Principles of Archeological Investigation. Excavation of the late Roman village of Khirbet Shema, Galilee. Introduction to ceramic chronology, numismatics, and other related disciplines."



Congress and the Smithsonian Institution, and finally to eastern Kentucky, interviewing individuals who could recollect the culture in its purest form. His plan called for him to remain in close consultation with his reviewing committee and to prepare and present a series of papers on his findings.

Normally, a student will design his plan of work only after he has been at Duke one semester. In exceptional cases, however, an applicant for admission to Duke University may prepare a preliminary proposal for the Admissions Office to transmit to the appropriate departmental Program II committee for tentative review and comment.

Advisers play an important part in the eventual success of a student's plan of study. A number of faculty members agree to serve each year not only as academic advisers for freshmen and departmental advisers for upperclassmen, but also as faculty associates involved informally with the academic and non-academic life of the various living groups. Students may turn as well to departmental directors of undergraduate studies, supervisors of freshman instruction, and the academic deans of the colleges.

Instead of standardized programs



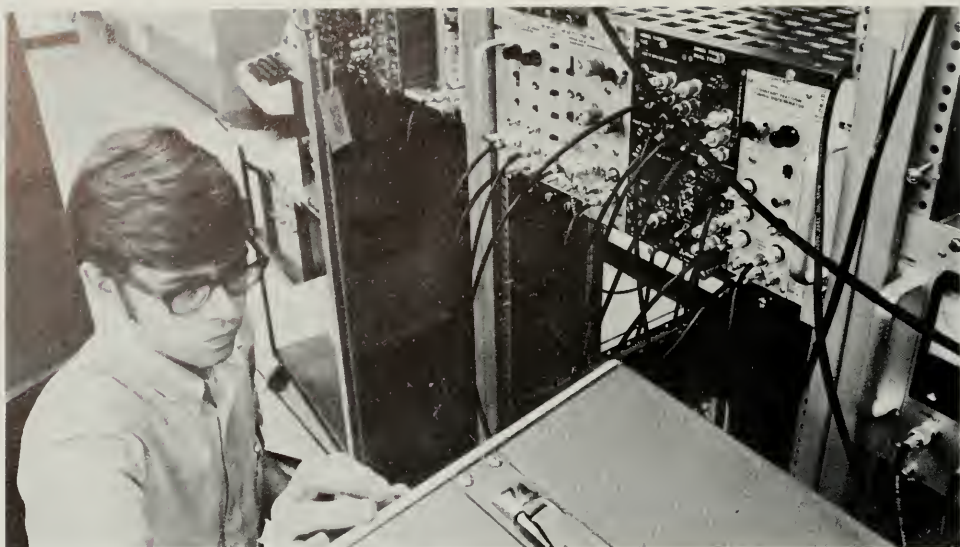
for students seeking admission to medical and dental schools, law schools, theological schools, and graduate schools, faculty advisers assist students in planning a curriculum that not only provides appropriate background for further study but also takes into account each student's abilities and interests.

Professional combination courses are offered to rising seniors in the liberal arts who wish to enter Duke's Schools of Law or Forestry directly following their junior year. These students earn the bachelor's degree in combination with the Juris Doctor or the Master of Forestry. Such plans, however, depend upon the student's admission to the desired professional school; once admitted, a student registers as an undergraduate senior and as a first-year professional school student. In special cases, students may also enter the School of Medicine following their junior year, although an undergraduate degree is not automatically awarded. Details are available from the Schools of Forestry, Law, and Medicine.

Study abroad, as part of an academic program leading to a college degree, must be a serious intellectual experience comparable in substance and

quality to more traditional aspects of college work. It is undertaken either through Duke-sponsored programs, through programs sponsored by other American colleges or universities, or through arrangements which have been made directly with foreign universities. An adviser on study abroad provides current information on plans for Duke students and will assist individuals or groups in planning for new programs.

Rather than sponsoring a regularly structured program of foreign studies for undergraduates, Duke emphasizes the flexibility necessary to meet the interests of small groups of students and faculty when the need arises. As an example, a group of students interested in music initiated a proposal for a semester of study in Vienna in the spring of 1973. An archaeological dig in Israel has provided the substance for a Biblical studies course in archaeological investigation. Students of English literature may be selected to participate in a year-long exchange program with the University of Warwick in England. Other groups of students and faculty have studied in Spain, France, Italy, and Germany. In all these programs the students enroll at Duke and pay the appropriate summer term or semester tuition.



"I took a seminar at the beginning of my freshman year and it was, in a way, like a comforting baby bottle—the class was small and the professor took a real personal interest in each one of us. His concern offset many of my feelings of being bombarded all at once with the impersonality and hugeness of college."



"I do feel it is about time students develop a sense of responsibility—'spoon feeding' is obsolete."



"While we are here at Duke University, that, and that alone should be our goal—to gain the knowledge and skills we need to become nation-builders. It doesn't matter where your interests or talents lie. As long as you put yourself and your Blackness into what you do, it's beautiful."

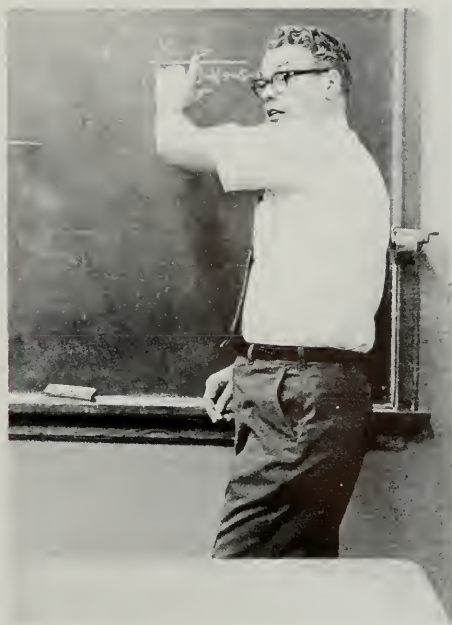


Engineering

If engineering is defined broadly as the application of technology to satisfy man's needs, it is clear that the professional engineer must be as capable of assessing those needs and developing new technology as he is of applying existing technology to them.

Engineering at Duke is characterized both by the technological environment of the School of Engineering—emerging primarily from its efforts to seek new knowledge and improved ways of implementing that knowledge—and by the liberal arts environment of the total University—arising from the natural and social sciences and the humanities and representing a spirit of free inquiry into the nature of man and of his world. The former encourages the engineering student to explore and to create; the latter encourages him to question and to maintain a human concern in all he does.

The School of Engineering offers a four-year program leading to the degree of Bachelor of Science in Engineering (B.S.E.) with majors in the Departments of Biomedical, Civil, Electrical, and Mechanical Engineering. For



detailed information on these four major fields, please refer to the section entitled Areas of Study. Special interdisciplinary programs such as energy conversion, engineering mechanics, materials science, ocean engineering, pollution abatement, systems and controls, transportation, and urban engineering also lead to the B.S.E. degree and may be arranged with the approval of the engineering faculty.

Nursing

The School of Nursing is a functional unit of the University Medical Center and at the same time one of the three undergraduate divisions of Duke University. The Duke nursing student, then, enjoys not only the challenges of her own profession, but also the total educational experience that only a major university can provide. Instructional and clinical facilities may be found in the 728-bed Duke Hospital, with the University's Highland Psychiatric Hospital in Asheville, North Carolina, and the recently acquired Sea Level Hospital on the North Carolina coast offering unique opportunities for students to pursue special interests. The North Carolina Cerebral Palsy Hospi-



tal, the Veterans Administration Hospital, the Durham Health Department, and the John Umstead Hospital provide additional, easily accessible resources.

The nursing program is designed not only to create professional competence but also to develop a sensitivity to the needs of man in his environment. The curriculum is a flexible one, building on a firm base in the liberal arts established in the first two years and culminating in the theoretical and clinical nursing courses of the second two years.

More detailed information about the nursing program is contained in the section entitled Areas of Study. In addition, students are encouraged to write to the Office of the Dean in the School of Nursing regarding any questions they may have.



"To draw your own innate and acquired qualities of character and skill out of their confining fat of natural ignorance, laziness, self-destruction. . . ."

Beyond the Classroom

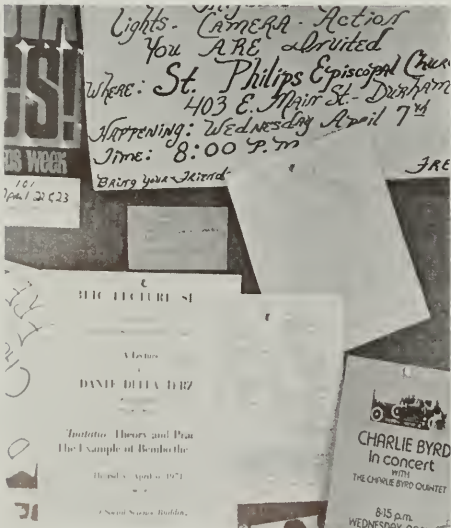
A student at Duke is part of an academic community which counts diversity as one of its greatest assets. With representatives from the fifty states and many foreign countries, the student body is a cross section of geographic, social, economic, racial, and religious backgrounds. Diversity alone does not produce a stimulating atmosphere, but it does provide the basis for an expanding perspective among students who hold in common a dedication to academic excellence and a desire to achieve the fullest personal development.

Life styles, fortunately, defy categorization. They emerge from an individual's conscious or unconscious effort to discriminate among alternatives, and once formed, they influence not only his own attitudes, actions, and degree of growth, but they make their mark in turn on the community from which they were drawn. And it is the discerning, aggressive exploration of alternatives—both in and out of the classroom—that characterizes education in progress.





"Look at the aerial views and maps of the Duke campus. Yes, there are beautiful quadrangles to give us a sense of identity and belonging, sunny gardens to play in, forests to escape to, libraries and labs to feed our curiosities. But what don't you see? Mr. Price was right. You don't see any air pollution here. Neither do you see any other signs that there are problems—serious problems—facing our society. Cloisters and forests can be dangerous if they are allowed to become an incubator.



"Duke is an excellent place to come to know yourself and to learn to live with yourself. May I suggest, however, that if you decide on Duke, you make the constant effort not to let yourself become an intellectual, self-reflecting hermit. Don't interpret that wall which runs around the campus as something which separates you and protects you from the lives and events beyond it.

"If you share these concerns about what is going on out in 'the real world', if you want to experiment with alternative ways of relating to people of the opposite sex or of opposite views, if you want an education which speaks to these concerns and alternatives, you can find it at Duke University, but you have to work for it. We welcome you to experience Duke, and we want to share with you in our struggle to make the Duke community one in which learning, love, and life are integrated."

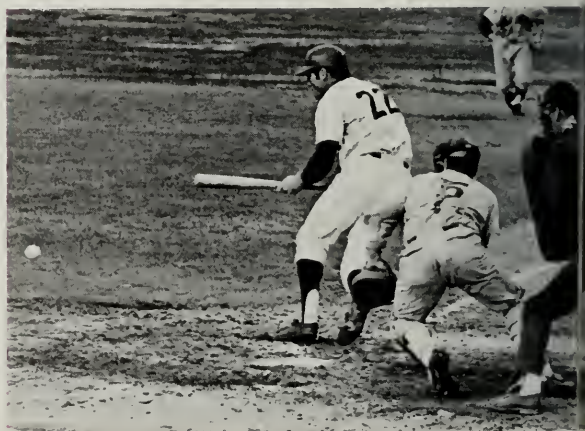


"Located at the top of the tower of the Student Union Building, the Office of the Association of African Students serves as a personal grotto—a place of solitude where Black reigns undisputed. Escape is not advocated, but the Society does serve as a retreat if such is needed."

"You don't have to be a super jock or a cheerleader to participate in athletics. Breaking away from the books for some physical exercise—intramural or individual—can bring life back into perspective."

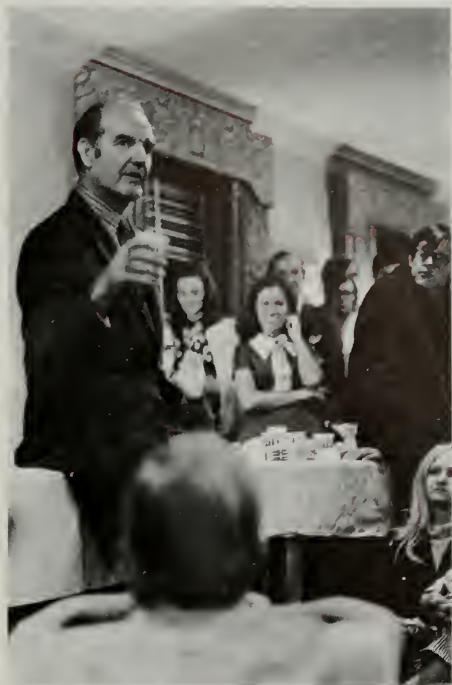


Above Ground Review
 Association of African Students
 AIESEC
 Archive
 Association of Independent Houses
 Associated Students of Duke
 University
 Bench and Bar
 Blue Jeans
 Campus Crusade for Christ
 Chanticleer
 Chapel Choir and Chancel Singers
 Cheerleaders
 Chronicle
 Concert Band
 Debate Team
 Directions for Educated Women
 DukEngineer
 Duke Players
 ECOS
 Film Society
 Hoof 'n' Horn
 Hillel
 Inter-Fraternity Council
 International Club
 Karate Club
 Madrigal Singers
 Marching Band
 Model United Nations Assembly
 Nereidian Club
 Newman Club
 Outing Club
 Panhellenic Association
 Pep Board
 Political Action Committee
 Pre-Medical Society
 Rugby Football
 Sailing Club
 Soccer Club
 State Student Legislature
 Students for a Democratic Society
 Symphony Orchestra
 Student-Faculty-Administration
 Committees
 Symposium Committee
 Tocqueville Society
 University Campus Christian Fellow-
 ship
 University Chorale
 University Christian Movement
 University Union
 WDBS
 Women's Recreation Association
 Young Americans for Freedom
 Young Democrats
 Young Republicans
 YMCA-YWCA





Duke is a member of the Atlantic Coast Conference and supports intercollegiate competition in football, basketball, track, cross country, golf, soccer, lacrosse, swimming, tennis, fencing, and wrestling.



"Bring a bike, not a car. You'll be able to see more and the exercise might do you some good."



"(DH 1) RALEIGH-DURHAM AIRPORT, N. C., Oct. 3—BLUE DEVILS' JOYOUS RETURN—The Duke football team returned home Sunday afternoon to a tumultuous welcome from an estimated crowd of 1,000 well-wishers who showered the Blue Devils with confetti as they emerged from a chartered aircraft. Duke Saturday defeated Stanford 9-3 in an upset of national proportions at Palo Alto, Calif. The black player nearing bottom of steps is Ernie Jackson, who scored the game's only touchdown on a pass interception. (AP Wirephoto) (tr12030dwk) 1971."

—Durham Morning Herald





Residential Life

This year's undergraduate chooses among a number of different living options, a variety which has come about with the acceptance of the recommendations of a student, faculty, and administration committee on residential life. The traditional residence houses for men on the West Campus and for women on the East Campus are complemented now by federations of men's and women's living groups and coeducational dormitories on both campuses. Men spend their first year either in all-freshman houses or in a number of independent and fraternity dormitory sections. Women's dormitories house freshman and upperclass women alike; social sororities have no separate houses or sections. Housemasters in the freshman houses and house counselors in the women's dormitories serve as resident advisers. Academic and social advising is available to other living groups through resident fellows, faculty fellows, and federation deans.

Dining facilities are available throughout the University. Students may pay a fixed board sum or pay

"Choose the teacher, not the course. The teacher makes a course a great experience or a real disaster."



for each meal at a time, depending on their residence house.

Living groups are being regarded increasingly as integral parts of the learning process, where faculty associates interact with their members on both an academic and social plane, and where house courses sponsored by the group can be taken for partial or total academic credit. In some instances, distinct living groups exist for students with special interests. Such a case is Epworth Inn, a women's dormitory where students share an interest in the contemporary arts.

Another type of living-learning group is SHARE, in which a small, diverse group of men and women from the three undergraduate colleges and schools attempt to create an atmosphere which will encourage students to pursue their individual intellectual interests and at the same time bring their benefits to the SHARE community. SHARE is housed in one building on the East Campus, with a graduate couple serving as resident advisers and a director administering the project. Dorm courses and SHARE-sponsored projects are open to the entire undergraduate student body.



Services

The Counseling Center provides a professional counseling service designed to aid students in gaining a better understanding of themselves and the opportunities available to them. Counseling is available in the areas of career planning, educational opportunities, and personal and social adjustment.

The Office of Placement Services provides some career counseling and aids in the placement of Duke students in teaching positions and in business and commercial firms after graduation.

The Student Health Program is closely related to the teaching hospital of the Duke University Medical Center, providing an unusually comprehensive service, available at all times. Students receive outpatient care in a health center on the West Campus and inpatient care in an infirmary on the East Campus.

Other services providing more immediate needs of students are handled by the University stores, and the laundry, banking, and post office facilities located on the campus for the convenience of the University community.



"Life in a dorm is a test of your ability to get along with others, and an important part of the liberal education that you've come to Duke to receive."



" 'I don't know enough yet—about the world, myself, others, least of all God—to want to begin my free life just now....' "

Admission

James B. Duke, in establishing his Indenture of Trust, requested that "great care and discrimination be exercised in admitting as students only those whose previous record shows a character, determination, and application evincing a wholesome and real ambition for life." In this light and in view of the institution's limited enrollment, Duke University looks beyond the basic characteristics of academic competence possessed by the majority of applicants. It seeks in each prospective student, regardless of race, color, religion, sex, or national origin, evidence not only of intellectual promise and maturity of judgment, but also a sense of positive energy, manifested perhaps in a special talent or accomplishment but unquestionably in a determination to benefit from the opportunities and challenges offered by the university.

Requirements concerning secondary school subjects are flexible, although at least 15 acceptable units of secondary school credit must be presented. Of these, at least 12 must be in college preparatory subjects such as English, foreign language, history and social studies, mathematics, and physical or biological sciences. Applicants to the School of Engineering are advised to





"We view Achievement Tests as part of the application, not simply a placement tool. They can be helpful to the student, too, in providing some important feedback early in the application process. It's not a bad idea, therefore, to think ahead and take the SAT's and Achievements in plenty of time to avoid schedule conflicts."



present 4 units of mathematics and at least 1 unit in physics or chemistry.

All freshman candidates are required to take the College Entrance Examination Board's Scholastic Aptitude Test (SAT), the English Composition Achievement Test, and two other achievement tests of their own choosing. Candidates for the School of Engineering must take an achievement test in math.

Applications may be obtained from the Office of Undergraduate Admissions, 614 Chapel Drive, Durham, North Carolina 27706. A financial aid form will be enclosed.

Most students file their applications and the \$20 application fee during the fall of their senior year. The secondary school report forms provided in the application packet should be given to the appropriate school official with the request that they be submitted to the University as soon as possible and no later than the application deadline.

The necessary College Entrance Examination Board Scholastic Aptitude Test and achievement tests must have been taken at least one month prior to the application deadline, with Duke University having been designated as a recipient of the scores.

"Of course we're looking for diversity in the student body. On the most general plane. I'd say we had an eye out for the person who will leap at an opportunity—in and out of the classroom—and then follow through."



February Notification exists for the student who wishes to hasten the decision on his application or who applies to schools which require a payment of fees prior to April 15. The application deadline for February notification is January 1 of the senior year, thus enabling the candidate to take SAT's and achievement tests as late as December of the senior year. (January test scores will arrive too late for February notification decisions to be made.) Decisions are mailed by February 15 and accepted candidates pay their reservation fees by March 1.

Students applying for February notification are not restricted to one college application; neither are unsuccessful applications postponed until the April 15 notification date. Rather, the candidate learns of the decision, positive or negative, by February 15.

April Notification candidates observe a February 1 application deadline, although most students file their applications and the \$20 application fee during the fall of the senior year. CEEB tests may be taken no later than January of the senior year. Decisions will be mailed by April 15, and accepted candidates should pay their reservation fees by May 1.



Midyear Admission is geared to the accelerating high school student, the high school graduate who seeks employment, travel, or independent study for a brief time before applying to college, or the accepted Duke candidate who for similar reasons wishes to postpone matriculation for one semester. The application deadline for new candidates is November 1. The student who wishes to exercise this option is expected to complete all the requirements set forth for fall admission and meet the same standards of eligibility held for all applicants to the University. SAT's and achievement tests can be taken as late as July preceding the application deadline. Students will be notified of the decision on their applications by December 1 with the expectation that those who are accepted will reply by December 15.

Advanced Placement may be arranged on the basis of results achieved in the Advanced Placement Examinations and achievement tests of the College Entrance Examination Board, or on tests given during Orientation Week. Only the Advanced Placement Examinations may lead to credit toward graduation for the course or courses omitted. In most cases, a

Transfer students usually have to live off campus until a dorm becomes available. They, too, are here. A lot of people like it that way, but you have to work a little harder to become part of the student community."



"I wish students would help us out in this effort we make to get behind the basic information in an application. Slides and tapes, for instance, can say so much more than a declaration of interest in art and music."

score of 4 or 5 on an Advanced Placement Examination will earn degree credit, and a score of 3 will merit conditional credit. Acceptance of a score is ultimately, however, at the discretion of the department involved.

Transfer Admission to Duke University may be arranged for a limited number of well-qualified students who present transcripts of a full year of academic work completed at fully accredited colleges. Courses in which a grade less than C- has been earned cannot be accepted for transfer credit. A transfer student will be asked to submit Scholastic Aptitude Test scores, although no achievement test results are required.

Because of the limited availability of on-campus housing, transfer students are requested to arrange for their own living accommodations off campus. The transfer student may wish to contact the Duke Housing Bureau for a list of recommended housing.

Students who wish to be considered for September admission must submit applications by March 1; decisions will be mailed by May 15. For February admission, applications must be

submitted by October 1; decisions will be mailed by November 1.

Applications may be obtained from the Office of Undergraduate Admissions.

Personal Interviews are not required for admission; however, candidates are welcome to visit the campus and talk with a member of the Admissions Office staff. The office is open for interviews from 9:00 a.m. to 4:30 p.m., Monday through Friday, and morning and afternoon tours are usually available. From January through April when applications for admission are being reviewed, individual interviews cannot be guaranteed. If a candidate wishes to schedule an appointment, it is desirable to write at least two weeks in advance of the proposed visit. In many cities throughout the country, personal interviews are available to candidates through local Alumni Admissions Advisory Committees. If such a committee exists in a candidate's community, he will be notified and a personal interview arranged. These interviews with alumni representatives usually take place during January and February.

Admission Calendar

January Freshmen

July 8, 1972*	Last SAT and Achievement Test date for January admission
November 1, 1972	Deadline for submission of freshman applications for January admission
December 1, 1972	Freshman applicants notified of admission and financial aid decisions
December 15, 1972	Accepted freshman applicants pay reservation fees

September Freshmen—February Notification

December 2, 1972*	Last SAT and Achievement Test date for February Notification applicants
January 1, 1973	Deadline for submission of February Notification applications
February 15, 1973	Candidates notified of admission and financial aid decisions
March 1, 1973	Accepted candidates pay reservation fees

September Freshmen—April Notification

January 13, 1973*	Last SAT and Achievement Test date for April Notification candidates
February 1, 1973	Deadline for submission of April Notification applications
April 15, 1973	Candidates notified of admission and financial aid decisions
May 1, 1973	Accepted candidates pay reservation fees

January Transfers

October 1, 1972	Deadline for submission of January transfer applications
November 1, 1972	Candidates notified of admission and financial aid decisions
November 15, 1972	Accepted candidates pay reservation fees

September Transfers

March 1, 1973	Deadline for submission of September transfer applications
May 15, 1973	Candidates notified of admission and financial aid decisions
June 1, 1973	Accepted candidates pay reservation fees

*Registration deadlines for SAT's and Achievement Tests fall approximately one month before each test date.

"Until that day of universal leisure and the understanding of the uses of leisure, I'd suggest that your work can be your most reliable life-companion, your safest hope of freeing yourself. . ."

Financial Information

Expenses

Total expenses differ, of course, with the tastes and habits of the individual student at Duke, but on the average, a student spends about \$4,500 during the academic year. Basic expenditures, with a reasonable sum allotted for books and supplies, follow:

Tuition \$2450

Income from endowment and contributions from alumni and other public-spirited men and women make it possible for the University to bear more than half the total cost of a student's education at Duke.

Room and Board (average) ... \$1200

The majority of rooms on campus are occupied by two students, although a limited number of single rooms is available. Cost varies according to accommodations.

Men and women on the East Campus choose between a 5-day and a 7-day board option. Students on the West Campus pay for each meal individually.

Books and Supplies \$175

These estimated expenses are subject to change, and the prospective



"This year all has provided an enriching experience but has also forced much needed growth and maturity upon me. I have gained an unpleasant but constant awareness of reality, but I think that as this freshman class progresses, we will overcome this and start learning for learning's sake."



student should consult the Office of Undergraduate Admissions for the most current information.

An initial, non-refundable reservation fee of \$120 is paid upon acceptance to the University in order to reserve a place in the freshman class.

Assistance

A college education, especially in a private institution, represents financial sacrifice for almost every family. Through its financial aid program, Duke endeavors to ensure that no student admitted to the University will be prevented from attending because of a lack of funds. Students in need of financial assistance are therefore encouraged to apply for both admission and financial aid; they will be notified of the financial aid decision at the time of acceptance.

A qualified applicant is admitted to Duke University regardless of means. After the admission decision is made, the University, with the assistance of the College Scholarship Service's evaluation of his Parents' Confidential Statement (PCS), examines the financial aid applicant's total resources and



determines the degree and type of aid required. Every effort is then made to provide the student with the assistance necessary to enable him to study at Duke.

Assistance comes in several forms—scholarships and grants, loans, and job opportunities—and often in some combination of the three. A special effort is underway to provide increased opportunities for part-time employment in various divisions of the University. Students generally assume an increasing proportion of loan and job funds as they progress through college. A single financial aid application, included among the application materials, will cover all Duke scholarships. With the few exceptions noted on the application form, students need not apply for a specific award, for the Director of Financial Aid will determine the appropriate scholarship for each applicant.

In 1971-72, approximately one-third of the student body received more than two million dollars in scholarship and loan funds.

In addition to investigating the specific awards noted below, the applicant is urged to consult his guidance counselor for information concerning the many national and local organiza-

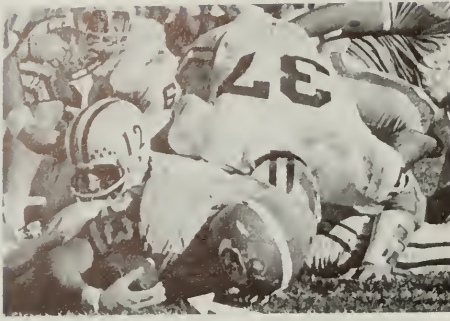
tions providing assistance not administered by the University.

Angier B. Duke Memorial Scholarships, the University's most prestigious awards, recognize students whose superior academic and personal records predict continued leadership in their chosen fields. The awards range from a yearly sum of \$500 to \$4,200, depending on the degree of need. Granted for one year, they are renewable from year to year as long as the student does satisfactory work.

W. N. Reynolds Memorial Scholarships, ranging in value up to \$4,200, are awarded on the basis of merit, first to children of employees of the R. J. Reynolds Tobacco Company, its subsidiaries and affiliates, then to residents of Forsyth County, and then to residents or natives of North Carolina. They are renewable annually.

J. Welch Harriss Scholarships, renewable yearly, are awarded the basis of merit and need first to students from High Point, North Carolina, then from Guilford County, and then from the State of North Carolina.

The Mary Duke Biddle Scholarship in Music Composition, a \$2,500 annual



award, is available to a member of each entering class and is renewable from year to year as long as the student does satisfactory work. The student wishing to apply for this award proceeds in the normal manner but also submits samples of his musical compositions. Eligibility is limited to students planning to major in music.

United Methodist Scholarships, valued at \$500 per year, are available on a basis of demonstrated need to Methodist students who have given evidence of leadership in their local Methodist Youth Fellowship Groups.

J. A. Jones Memorial Scholarships, sponsored through the Jones Fund for Engineering, are awarded to engineering students whose outstanding academic and personal qualifications suggest that they will become leaders in a technological society. The awards range from a yearly sum of \$500 to \$3,600, depending on the degree of need. The Jones Scholarships are granted for the first year without regard to the student's intended major within engineering, and they are renewable on the same terms for the

second year as long as the student does satisfactory work. For the last two years they are limited to majors in civil engineering.

Christian Vocations Scholarships are available, on the basis of need, to students preparing to enter full-time religious work. Students approved are required to sign a note each semester for the amount of financial assistance granted to them. These notes will be cancelled upon evidence that the student has entered full-time Christian work following graduation.

Children of ministers in the North Carolina and Western North Carolina Conferences of the United Methodist Church who are residents in the Conference and children of ministers of all faiths residing and serving churches in Durham County are eligible to receive a remission of the tuition charge for a maximum of eight semesters of undergraduate study at Duke.

A limited number of awards will be made each year to qualified students from other countries who enter either as freshmen or as students with advanced standing. Candidates for these awards are required to submit the



Application for Scholarship and Financial Aid and the Parents' Confidential Statement of the College Scholarship Service provided by the Admissions Office of Duke University.

Beginning in the second semester of their freshman year, cadets are eligible to compete for an Air Force ROTC College Scholarship. This scholarship includes full tuition, books, laboratory fees, and \$100 per month subsistence. The scholarship is awarded on a merit basis and considers academic achievement, leadership potential, and overall performance.

The NROTC College Scholarship program provides for four years tuition, fees, and textbooks at government expense plus subsistence and summer active duty pay which amounts to approximately \$1,450 per year. Selection for this program is made on the basis of an annual nationwide test and selection procedures.

Scholarships from industry, ranging in value from \$200 to \$2,000 are also awarded.

A pamphlet describing the financial aid program in greater detail may be obtained from the Director of Financial Aid.

"No, we don't have a Department of Parapsychology. The research group which gained such fame for its studies in extrasensory perception now carries on its activities independently as the Foundation for Research on the Nature of Man. Located just off the East Campus, it is still within easy reach of interested members of the Duke community."



"... provided any special interest of yours is dealt with at Duke, its major resources will match your needs and abilities and will test your character and stamina, your determination to do serious work, to have a free and serious life...."

Department titles can often be misleading. A major in Russian, for instance, finds his area of study under the heading Slavic Languages and Literatures; business administration translates into Management Sciences. If your field of interest is not represented in this section in the form you may have anticipated, write to the Office of Undergraduate Admissions for clarification.

Areas of Study

Anthropology

Anthropology is a comparative discipline which studies man everywhere, in all aspects of his nature and behavior. Physical anthropologists study the origin and development of man's physical nature and his place in the biological world. Their major concerns are with the study of fossils, genetic processes, and contemporary primate species. Psychological anthropologists investigate individual enculturation and growth and the psychological characteristics of specified groups of peoples. Archeologists and prehistorians study the events and processes of man's unwritten past. Anthropolog-



ical linguists analyze contemporary languages, as well as languages of the past, and trace relationships between language and culture. Social and cultural anthropologists, who form the largest group, try to determine the principles underlying human social and cultural behavior of all kinds. Contemporary tribal peoples, peasant societies, new nations, the modern city, religious and other cultural revival movements, music and art forms of peoples of the world—all are the subject matter of cultural and social anthropology.

The Department of Anthropology offers a comprehensive program to undergraduates who want to specialize in the comparative study of human societies and cultures and the human physical form. Two general courses (Anthropology 93 and 94) introduce students to the scope, concepts, and methods of anthropology while preparing them for more specialized studies at an advanced level. In the 100-series of courses, the student may take theoretical courses concentrating on such topics as religion, kinship, politics, ecology, psychology, and kinship or area courses devoted to ethnographic and theoretical materials on American Indians, Africa, Oceania, South Asia, and the Middle East. Advanced students are eligible to take 200-level courses where, along with graduate students and faculty, they will participate in library or even field research and sharpen their competence in their particular subfield.

Most students who choose anthropology as a career will find that an advanced degree is a prerequisite for obtaining a satisfying position, given today's competitive job market. A major in anthropology—alone or in combination with another relevant discipline—can provide an incomparable background for graduate work in all disciplines (law as an example) that concern human behavior. Men and women who plan to begin their careers directly after graduation from college can profit from a single or joint anthropology major in many types of management training programs and social services.

Art

The field of art embraces two areas—the practice of art and art history—which represent different, but not mutually exclusive avenues for the acquisition of knowledge and experience in the visual arts.

The practice of art as experienced in the studio is limited to basic design, printmaking, and painting through which the student may gain sufficient experience to define his interests and aptitudes for later specialization. The program does not attempt to accomplish professional training in specific practical art skills, but rather to fulfill an objective of liberal education to which the art experience is a contributing factor. A talented student may upon graduation enter a graduate or professional school and expect to accomplish his professional objectives within a two or three-year period of concentration.

Art history is an aspect of cultural history which merges with other humanistic areas, such as philosophy, religion, and literature. By the nature of its research methods and documentary sources it presupposes a concurrent development in language tools.

A student electing the art major concentrates in either art history (8 courses) or in studio (7 courses). The department offers an honors program in art history which leads the superior student into independent study and research as a prelude to graduate study in the field.

A new art museum now makes possible first-hand study of works of art in the permanent Brummer collection of medieval art as well as in significant and specially prepared exhibitions. Some opportunities for museum study and method are open to qualified students.

Black Studies

Black studies is designed to provide instruction and study directed toward the concerns and particular experiences of Black America. Though intensive work (a major) is worthwhile and

encouraged, it is recognized that course offerings in Black studies are important to many students' primary fields of endeavor, as well as comprising an essential component of a liberal arts education.

The student majoring in Black studies will receive special counseling in planning his course of study and in considering his future vocation.

Botany

The Botany Department faculty represents a broad spectrum of discipline areas in the field, with four areas being particularly strong: ecology, systematic plant biology, genetics, and physiology. In addition to laboratories in the Biological Sciences Building, students and faculty have access to the phytotron (one of two facilities in the Southeast for studying plant growth under controlled conditions), an experimental plot (for local ecological studies), and the Marine Laboratory at Beaufort (for oceanographic studies). The undergraduate who majors in botany receives considerable personal attention and develops an individual undergraduate program under the guidance of the Director of Undergraduate Studies. Classes are small and independent work is stressed. In addition to programs which provide a strong background for advanced work in the field, careful course selection provides a broad biological background suitable for entry into several other areas. A new interdisciplinary program in environmental studies, an interdisciplinary approach to oceanography, and studies in plant systematics and organismal diversity are examples of the kinds of programs that can be developed.

Chemistry

Chemistry is concerned with matter, its structure, properties, and the nature of the reactions which change it, and it therefore supports all the basic biological and physical sciences,

biochemistry, and the whole spectrum of paramedical studies.

The Bachelor of Science degree is ordinarily elected by students intending to pursue study at the graduate or professional level in chemistry or a closely allied science. The Bachelor of Arts degree offers a grounding in most basic areas of chemistry while providing full opportunities for election of broadly related work. In both degree programs, courses appear in sequence from general chemistry to the progressively more theoretical fields. Organic chemistry describes the geometry of individual compounds of carbon, the mechanistic principles underlying chemical change as well as the methods of synthesis of organic compounds. Physical chemistry offers a critical, rigorous examination of the principles of chemistry including the states of matter, quantum phenomena, thermodynamics, and chemical kinetics. Analytical chemistry treats in depth separation procedures and techniques of measurement and chemical analysis such as spectroscopic and electroanalytical methods. Inorganic chemistry applies physical and mathematical principles to studies of reactions, bonding, and structures of compounds of elements other than carbon.

Independent study completes the major, providing for the student majoring in chemistry the first significant opportunity to focus his education and experience on a piece of research under a faculty member in the department. Alternatively, those students whose interests range broadly may select a non-experimental research project in which the conceptual, philosophical, historical, economic, ecological, or societal aspects of chemistry are treated.

Classical Studies

The field of classical studies, encompassing not only the languages and literatures of ancient Greece and Rome, but also their history, philosophy, art, and archaeology, takes as

its aim the establishment of an informed and critical view of the foundations of Western culture. The specialist in classical studies may be a student of the social and economic history of a portion of the ancient world; he may equally well analyze the imagery of great works of ancient literature, the iconography of pictorial or architectural monuments, or the survival of texts in the manuscript tradition.

In order to accommodate the wide range of interests embraced by the field, the Department of Classical Studies offers a variety of courses on all levels. The study of Greek and Latin may be begun or continued at Duke. The first two years of the language provide a linguistic foundation and quickly introduce readings from several of the chief authors. More advanced courses offer concentrated study of single authors, literary genres, or periods. Classical studies courses provide an English language introduction to ancient literature as well as introductory and advanced courses in ancient history and ancient art and archaeology. Knowledge of Latin or Greek is not required for these courses. Small group learning and independent study are stressed, and both freshmen and upper level seminars are offered.

The diversity of the field and the varying interests of its students prompts the department to offer three distinct major programs: Latin, Greek, and classical studies, with emphasis in ancient history or archaeology. Departmental majors may apply for a semester at the Intercollegiate Center for Classical Studies in Rome during their junior year as a regular part of their program.

Computer Science

The digital computer is assuming a steadily increasing role in our day-to-day affairs and has become an indispensable tool in almost all scientific research. It is also beginning to play a significant role in the study of linguistics and the humanities. Although no undergraduate major is offered in com-

puter science, the department (created in 1972) offers a variety of courses to enable undergraduates to perceive the implications of the computer, to utilize more efficiently the many computer facilities available to them at Duke University, or to prepare for a career in the rapidly expanding field of computer science.

The introductory course, Introduction to Digital Computation, makes no assumptions about the student's background in mathematics, and is designed for the student who wants to attain an understanding of computers and programming, whether or not he plans to pursue the subject further. The course also serves as the introduction to more advanced courses on the theory of computer design, their capabilities, and their use. Other courses open to undergraduates cover computer systems, numerical analysis, data structures, programming languages, switching theory, statistical computing, information storage and retrieval, and computer simulation.

A student who is planning to work as a programmer or systems analyst with a B.A. degree will find courses offered which give a thorough preparation for such a career. He should choose a major which will give him some knowledge of the field in which he wishes to apply computer techniques.

Graduate work in computer science does not require an undergraduate computer science major. The most important prerequisite will be a solid background in mathematics. Since many of the exciting frontiers in computer science involve the marriage of computer science to other areas, it is important that the student interested in applied computer science choose a major which will give him a basic area of expertise beyond that of programming techniques. Meanwhile, the student should take the available undergraduate computer science courses and as a junior or senior, he should try to take some of the introductory graduate courses offered.

The faculty of the Computer Science Department will be happy to advise students on courses of study that will

prepare them for a career in computer science.

Economics

This world is an inhospitable place. It gives up grudgingly fewer resources than we could use and we must compete with each other for the use of even these limited resources. The materials used to build a swimming pool for me are no longer available to build a swimming pool (or anything else) for you. The theater seat I occupy can no longer be used by you. The job I obtain is no longer an option for you to consider.

The manner in which these conflicting self interests among members of society are resolved is the subject matter of economic analysis. The purpose of economic analysis is to predict the consequences of "tampering with the system" (modifying the institutional arrangements of society). Thus, the job of economics is to answer "what if" questions. What would happen if the government of the United States employed price controls? What would be the likely consequences of ending the military draft? Could a system of taxes solve our pollution problem?

The first courses in economics aim to develop in the student critical and analytical skills essential for understanding economic problems and institutions in both their contemporary and their historical setting. Higher level courses are usually concentrated on particular economic problem areas: labor unions, monetary policy, market power, poverty, and so forth.

Although no particular vocational or professional goal is emphasized by the department, economics majors are usually interested in a program of study which will prepare them for graduate study or professional training in economics or administration and/or in a general liberal arts program which might either be terminal or preparational for the study of law.

For additional information write to the Director of Undergraduate Studies in the Department of Economics.

Education

At the undergraduate level, Duke University prepares teachers for both elementary and secondary schools. A student majoring in elementary education gains knowledge and skill in all of the areas taught in elementary school and acquires as well an understanding of child development and learning theory. The University prepares teachers for secondary schools in the fields of art, English, foreign languages, physical education (women), mathematics, music, the sciences, and the social studies. Prospective secondary school teachers major in the academic department of their principal interest and choose related work in the education department. There is a special major in science education designed to provide a broad background in the sciences and mathematics.

Students preparing to teach devote an entire semester of their senior year to courses in designated subject matter and professional education, and to student teaching. During the last half of this semester they are engaged in full-time observation and student teaching in schools. During this half of the semester, students should plan to live in a community which is some distance from Durham. This will entail some additional living expense to be borne by the student teacher. Room rent refund is not made.

Advisers in the Department of Education will help in planning a program that will serve individual student needs and establish eligibility for admission to the student teaching program. Advisers will also help in designing a program to meet the requirements of the state or states in which the student desires certification. Students should consult an adviser in the Department of Education early in their program at Duke and should confer with this adviser at each preregistration period.

Engineering

Biomedical Engineering is concerned

with the application of quantitative methodology of engineering to problems in biology and medicine. Components of this program at Duke are mathematical modeling of biological systems using digital and analog computers, instrumentation and circuitry for monitoring biological systems, analysis and design of artificial organs, and quantitative consideration of environmental variations on organisms.

The increased awareness of the impact of technology on the environment should produce an increased demand for engineers with biomedical training in many general industrial and governmental activities. Industries, government agencies, and academic units which are directly concerned with health delivery systems are the major employers of biomedical engineers at this time. Also the undergraduate biomedical engineering curriculum with proper use of electives provides good preparation for medical school.

The undergraduate curriculum places a fairly heavy emphasis on mathematics and computer science. Basic course work in chemistry, physics, zoology, and basic engineering sciences is required for the broad foundation of biomedical engineering. The sequence of courses taught in the Department of Biomedical Engineering normally begins in the fourth semester.

Approximately one-third of the thirty-two courses required for the B.S.E. degree are electives which allow the student to follow his interests and career aspirations. A minimum of five of the elective courses are required to be taken in the humanities and social sciences with the objective of increasing the awareness of biomedical engineers to esthetic and ethical considerations.

Civil Engineering may be defined as the art of conception, design, analysis, and building of constructed facilities. There are six major specialty areas of civil engineering at Duke. Environmental engineering deals with the quality of human environment as

affected by water supply and wastewater treatment and disposal. Water resources engineering is concerned with the usage, preservation, and replenishment of water resources including those of the ocean. Geotechnical engineering is concerned with interaction between engineering structures and the earth's crust as well as with earth construction. Mechanics and materials engineering deals with the behavior of materials under various conditions of loading and environment. Structural engineering handles the economical and safe design of engineering structures. Urban engineering encompasses a broad spectrum of integrated technological problems such as land and city planning and development, mass transportation, and public health and safety. In addition, a student may elect a general program of civil engineering studies, or an interdisciplinary program of management sciences combined with civil engineering.

The program is flexible enough to accommodate a wide variety of interests and progressive enough to prepare the student for graduate and professional schools in areas other than engineering. For the non-major, the Civil Engineering Department offers courses in environmental pollution, urban systems and transportation, and computer analysis. Excellent laboratory facilities are available to students in all major areas of interest.

Electrical Engineering utilizes the electric and magnetic forces of nature and the properties of matter to supply human needs. Because electricity is the most flexible form of energy available to man, electrical engineering influences the lives of most of the world's population. This profession is concerned with the processing and transmitting of information—as in television, radar, radio, electronic measurement, and computation. It is equally concerned with the processing, transmitting, and controlling of energy—as in rotating machines, power systems, and automatic industrial processes. It provides most of our labor-saving home appliances

and many of the instruments of scientific research and modern medical practice.

For more detailed information concerning the major in electrical engineering, write to the Director of Undergraduate Studies, Department of Electrical Engineering.

Mechanical Engineering will involve the student in a broad spectrum of studies designed to enable him to perform in a profession whose aims are to bring the scientific knowledge of man to bear upon his human needs. The program of study offered is designed to provide thorough preparation for more advanced study at the graduate level as well as for professional activity at the baccalaureate level.

The curriculum in mechanical engineering provides for many alternate paths. All begin with the acquisition of the basic tools of mathematics, physics, and chemistry and the extension of these basic sciences into such areas of engineering science as solid mechanics, thermodynamics, fluid mechanics, and heat transfer. At this point the student may wish to emphasize one of the traditional areas of mechanical engineering such as automatic control and system dynamics, materials science and development, design of mechanical systems, propulsion and energy conversion, or thermal and fluid sciences. On the other hand, the program is sufficiently flexible so as to allow the student to emphasize an interdisciplinary area such as environmental quality and control, industrial administration and business management, ocean engineering, transportation systems engineering, urban engineering, and many others. The flexibility inherent in the program also affords an in-depth study of subjects external to engineering. This provision was motivated by the ever-increasing need for the engineer to be sensitive to the impact of his work upon society.

Senior projects and undergraduate laboratories in the areas of system dynamics, materials development and processing, thermal and fluid systems,

and systems response and control provide environments for a learning experience and for the development of professional attitudes and approaches to engineering problems.

Geology

Geology is the science concerned with the study of the earth—the physical processes acting on its surface (water, wind, ice), its composition (rocks and minerals), structure (continents, ocean basins, mountains), economic products (oil, gravel, water, uranium), and past history (origin, shifting positions of land and sea, evolution of life).

Men and women versed in geology are called upon by government and industry to assist in determining the location of petroleum deposits, the nature of natural pollution in streams, or perhaps the predication of earthquakes. Oceanography, seismology, hydrology, paleontology, and astrogeology are among the research specialties undertaken by modern geologists.

Courses of special interest to the non-major include Geological Environments and Man, The History of the Earth, and Introductory Oceanography. Following the introductory survey courses, basic training for a major in geology is taken in two fields—minerals and rocks, and stratigraphy and structure. The paleontologist must be trained in biology, however, and the mineralogist in chemistry, so the student of geology must extend his training into one or more of the related sciences or mathematics. Provision for interdisciplinary majors and close student-faculty cooperation within the department are additional features of appeal to geology students.

Germanic Languages and Literature

The study of German is concerned with the language, literature, and cultural traditions of Germany, Austria, and German-speaking Switzerland, and

with the cultural, political, and social institutions, since they determine and clarify the context from which the literature arises. Maximum use is made of German in all courses. After having mastered the basic skills of the introductory and intermediate levels, the student proceeds to courses in which the emphasis is placed on reading and analysis of literary texts. All students above the intermediate level have the opportunity to take part in seminars and preceptorials, small-group learning experiences which emphasize active contributions by the participants.

Two language laboratories, a German table, informal coffee hours, and periodic programs arranged by Delta Phi Alpha, the German honorary, encourage the student's active use of German and bring him into frequent informal contact with members of the teaching staff. The opportunity to study in Germany exists with full credit for approved academic work taken abroad. Graduating majors compete for a scholarship to study at a German university for one year with all expenses paid. Career opportunities include such areas as government service (e.g., State and Defense Departments), export-import trade, and high school and university teaching.

Health and Physical Education

The physical education program is designed to give the student an appreciation of the value of regular exercise and skill in activities which can be enjoyed as recreation during and after college.

In the men's program, a student undergoes an evaluation of his physical potential and acquires an understanding of the meaning of the physical education process. Following a semester of this individualized program of activity, he is encouraged to elect courses best suited to his needs. A wide variety of individual, dual, and team sports, as well as such activities as sailing and skiing, are available to

him. Although there is no departmental major for men, a number of courses in physical education are open as electives for the student who may wish to coach or teach in high school and for others who find such courses appropriate.

The women's program provides a wide variety of activity courses from which the student may choose. In addition, a major in physical education is offered for women students. Areas of study in physical education include structure and function of the human body, motor learning, the effects of exercise on human functions, sports and dance in education and recreation, and health affairs. The major may be used as preparation for teaching physical education and health, for recreational leadership, for entering physical therapy or graduate study, or for its intrinsic contribution to undergraduate education. The Director of Undergraduate Studies in the Woman's Department of Health and Physical Education will assist students in designing a course of study to fulfill their educational goals. Those preparing to teach should consult the Education Department regarding certification requirements.

History

The study of history provides insights into how people of different times and places grappled with the problems of organizing their societies and making life meaningful for themselves. Today, in our age of changing national and world perspectives, a knowledge of history—and of the methods used by historians to study it—is more important than ever before. The range of subjects offered by the department covers all periods of American history (including Afro-American), European history from classical to contemporary times, Asian, African, Russian, Latin American, and military history, and the history of science, technology, and medicine. In all courses, emphasis is placed on encouraging the student to think critically and to master the various techniques of historical investigation through

class discussion, lectures, and research.

Discussion sections or seminars add to the variety of learning experiences at every level, from introductory courses in classical, European, non-Western, and American history to advanced seminars. Faculty of all ranks teach both the introductory and the more advanced courses.

The student majoring in history is urged to broaden his understanding by exploring other subjects. Indeed, the student who desires to combine historical studies with a related discipline, or to develop an interdisciplinary Program II curriculum, is encouraged to do so.

For the student majoring in other subjects, every effort is made to offer courses in history which fit a variety of interests and programs of study.

Management Sciences

The program in management sciences is designed to provide an understanding of businesses and other economic enterprises and their influence on society. Conceptual understanding of, and analytical reasoning related to, problems of modern management are stressed as opposed to "first-job" type skills. The basic tools of mathematical analysis, information systems, organization theory, and economic theory are combined to develop a fundamental understanding of the role and function of complex business organizations in society.

This liberal arts oriented program provides the foundation for those desiring further study in law, business, or the other social sciences as well as those planning to continue their education as leadership trainees in many organizations. It is possible to combine this program with in-depth studies in other areas of the student's choice, such as mathematics, the natural sciences, or the other social sciences. Provision, too, is made for professional preparation in accounting, including adequate course work to prepare for the Certified Public Accountant examination.

Work leading to Graduation with

Distinction is available for majors in the department.

Mathematics

Traditionally mathematics is divided into three branches: algebra, analysis, and geometry. The branch called algebra stems from arithmetic and today includes such subfields as linear algebra, polynomials, combinatorial analysis, and number theory, all of which have applications in the social sciences and computer science.

The second branch, analysis, was initiated by Leibniz and Newton toward the end of the seventeenth century. Here the new and basic concept of a limit was introduced, and it has since proved to be one of the most fruitful in mathematics. Analysis is usually considered the most important branch of mathematics since it is indispensable in physics, engineering, and other natural sciences. Today analysis includes such topics as calculus, differential equations, and complex variables.

The third branch of mathematics, geometry, has its origins in the Euclidean geometry studied by the ancient Greeks. Since that time other types of geometries have been developed, although at the same time many topics, geometric in origin, have been absorbed by algebra or analysis. One of the most important subfields of geometry, topology, is fundamental in the study of limits and in establishing the foundations of analysis.

Any student with an interest in the social sciences or the natural sciences should (and probably will be required to) take some mathematics. Normally such a student begins with calculus and proceeds through the calculus sequence. Warning! Any student with a weak background in mathematics should not take calculus simply to satisfy the natural science division requirement. If he must take calculus he is advised to take a pre-calculus course before entering Duke in the fall.

The Director of Undergraduate Studies in the Department will provide further information to interested students.

Music

The Department of Music at Duke offers a curriculum of flexibility and latitude. Within the music major, students are encouraged to achieve a balanced experience in three divisions of music study—theoretical analysis and composition, music history, and performance—and to pursue one in upper levels of concentration. The non-major is welcomed into many of the courses and activities of the Music Department. The performer may continue private lessons and participate in the various vocal and instrumental organizations.

The faculty is composed of artists and teachers who are performers, composers, and historians. The low ratio of students to faculty affords the opportunity for sustained individual attention through private and independent study. Class lectures and seminars are supplemented by conferences with visiting scholars, composers, and performers.

Areas of specialization for music majors are the three divisions of music study cited above. In theory and composition, techniques of orthodox and electronic composition are taught by composers, and performances of student works are regularly scheduled. Music history aims at the evaluation of the music styles of Western civilization through reference to the artist and his era. This may be supplemented by the study of non-Western and primitive music. For students interested primarily in performance, private instruction is available in voice, piano, organ, and orchestral instruments. Opportunities for both solo and ensemble performance experience are abundant.

Nursing

Standard course requirements in the first two years of the School of Nursing program include two semesters of a laboratory science course (usually biology or chemistry), a freshman English course, at least three courses in the social science areas of psychology, anthropology and sociology, a basic statistics course, and a two-semester

human ecology course. Students completing lower division requirements at other colleges may in certain cases fulfill the human ecology requirement by completing courses in anatomy and physiology. These courses may also be taken within the junior year curriculum. Two semesters of physical education must be completed within the first two years. Other courses necessary to bring the lower division total to sixteen are selected by the student, with the assistance of her academic adviser, in accordance with her specific goals and interests.

The focus of the junior and senior years is on the nursing phase of the curriculum, with the third year devoted largely to basic nursing courses and the fourth to beginning specialization. Other areas of special interest may be pursued if desired. The nursing student might choose specialized clinical, teaching, or administrative experiences, or general nursing in hospitals or community agencies. She may even pursue some form of independent study. In each case she will find an opportunity to practice skills, develop an understanding of the entire nursing process, and assume those characteristics which mark the professional nurse.

Questions should be directed to the Office of the Dean of the School of Nursing.

Philosophy

Philosophy is the attempt to illuminate and, if necessary, to criticize the most fundamental concepts which are present in human thought. These concepts form the various ways in which we comprehend ourselves and the world in which we live. In metaphysics, these are such basic concepts as mind, matter and real existence; in epistemology, or the theory of knowledge, such concepts as rational belief, truth, evidence, and justification. Ethics is an examination of value, morality, goodness, and obligation. Logic deals with the concepts and principles which are involved in any argument or proof, such as validity, inference, and systematic thought.

A study of philosophy does not in itself lead directly to any career except the teaching of philosophy. But students planning a career in other areas will often major in philosophy because of its value in making us aware of the methods, assumptions, and goals of whatever field one works in, and in stimulating a broad vision of ourselves and the world by raising ultimate questions. Many law schools encourage a major in philosophy, for example, for its development of critical and analytic thought.

There are two types of courses included in the philosophy curriculum—systematic and historical courses. The former are more directly problem-oriented, whereas the latter approach philosophical problems in terms of the thought of some of the great thinkers of the past and present. Many courses of the former type, however, such as the standard Introduction to Philosophy, also involve a certain amount of reading in the philosophical classics.

Physics

The field of physics is one of the most absorbing subjects in the natural sciences. The theories of relativity and quantum mechanics not only have altered the direction of physics but also have changed man's philosophical ideas of nature. The invention of the transistor has produced a revolutionary change in the electronics and computing industries; the impact of the Laser may prove to be just as revolutionary. The study of elementary particles is proceeding on the frontiers of our knowledge about the nature of matter.

At the introductory level, the Department of Physics offers a course to students who wish to learn about the ideas and discipline of physics and another to those who will need a more intensive study of the field either for a major in physics or in some other science. The undergraduate majoring in physics does not specialize in a given field of physics, but receives an extensive training in several basic areas. The sequence of courses is in-

troductory physics, modern physics, mechanics, thermodynamics and kinetic theory, electromagnetic theory, optics, quantum mechanics, and an advanced physics laboratory.

At all levels there exists the opportunity to become aware of, and perhaps affiliated with, the research being carried out in the fields of nuclear physics, elementary particle physics, the structure of molecules and solids using both microwave and optical techniques, the properties of matter at temperatures approaching absolute zero, and theoretical physics.

Political Science

The Department of Political Science seeks to convey an understanding of the philosophies, practices, and problems of government and politics. In pursuing this broad objective a variety of materials and approaches is used: historical, legal, institutional, philosophical, empirical, and quantitative. As a consequence, political science is a broadly based social science, one sharing the aims of a liberal arts education as well as one evoking concern for an understanding of the public policy problems of our time. Political science seeks to understand why human beings behave as they do in the arena of politics. It is concerned both with the collection of empirical data about such behavior, with an examination of the process of decision-making and with the normative judgments which influence a political decision. Although a benefit to those students seeking a broad liberal education, the study of political science is likely to be of special usefulness to those interested in a career in law, politics, business, journalism, teaching, foreign service, and government employment.

The student of political science should begin with the basic lecture course, the American Political System. He may supplement the lecture format with a small-group learning experience which meets once weekly for discussion.

A student majoring in political science must take a total of eight courses

in the department, including at least two graduate courses or senior seminars, and including at least one course in three of the four basic areas of the curriculum: political theory, American politics, comparative politics, and international relations. Opportunities are also available for independent study and internship credit during the course of study.

Psychology

Psychology is the study of the behavior and experiences of living organisms. Depending upon the nature of the particular problem, psychological study shares the character of the natural sciences on some occasions and that of the social sciences on others.

The undergraduate major in psychology does not prepare a student for immediate practical work in the field. Rather, the chief objective of the undergraduate program is to acquaint students with principles and methods and provide them with some understanding about how the broad range of psychological inquiry is conducted. The field rests on research findings about such diverse topics as brain-behavior relationships in animals and men, the determinants of learning and remembering, biological and social origins of motivation, the development of traits and attitudes, and the conditions and consequences of social influence.

The Department of Psychology seeks to recognize the diversity of content by offering four first-level lecture courses. Collectively, these courses are intended to give beginning students an opportunity for lively engagement with specific fields and methods of investigation.

Available at the intermediate and advanced levels are lecture courses as well as a variety of laboratory courses involving the design, and often the execution, of experiments in specific problem areas. The latter are taught in small groups of twelve to twenty students. For the capable major who seeks intensive involvement with special problems in research and

theory, opportunity for study is available in group tutorials, graduate-undergraduate seminars, and independent work under faculty supervision.

Public Policy Studies

Public policy is the formal product of governmental action. The academic study of public policy involves analysis both of the processes by which government organizations design and implement particular policies, and of the effects which those policies have on society. The undergraduate major in public policy studies, sponsored by the Duke Institute of Policy Sciences and Public Affairs, aims to provide students with the theoretical tools needed to perform policy-related field research, evaluate the impact of specific policies, and make complex policy decisions.

Through a series of core courses on economic and political analysis, statistical methods, and normative theory, majors in public policy studies will acquire a set of analytical tools. They will gain first-hand experience in utilizing these tools by taking a multi-disciplinary internship course, which combines two semesters of classroom study of a particular problem area with a summer internship of work in an organization developing policy for that area. Internship courses include Communications Policy, Health Policy, and the Administration of Justice; others are planned for the near future.

Religion

If entering students have had courses of instruction in religion, they will, very likely, have had them in contexts quite different from that provided by the Department of Religion at Duke. Rather than to inculcate or discipline faith or belief, the function of the department is to address with various methods the subject matter and problems around which it is organized. This means that work in religion supports and is complemented by work done in other departments of the Uni-

versity, especially in the humanities and the social sciences.

The faculty of religion attempts to clarify for students the importance of the religious factor to a period of history or to some form of human experience. It attempts as well to increase in students their appreciation for matters of religion and their ability to employ appropriate methods for understanding them.

The nature of the material and the range of approaches allow the major in religion a breadth of choices for concentration, providing him with a basis for entering later either professional or graduate study in religion or professional training or advanced work in some other field. Non-majors will find courses offered by the department that are related to work they are doing in their own major fields.

The principal areas of work within the department are these: Biblical studies, the history of Christian life and thought, the history and phenomenology of religions, religion and social sciences, and religion and the humanities. The department regularly offers seminars and courses open to freshmen which lead to more advanced work within these several areas.

Reserve Officers Training Program

The Department of Aerospace Studies (AFROTC) functions as a regular department of instruction. It provides to selected college men and women a professional education leading to a commission as a second lieutenant in the Air Force Reserve. Freshmen and sophomores enroll in the General Military Course and, upon its successful completion, may apply for continuation in the Professional Officer Course. Draft exemption is provided when necessary. A provision exists for interested cadets to request delay of entry on active duty for the purpose of attending graduate school.

Qualified freshmen and sophomores who earn a C⁺ average may apply for an Air Force Scholarship during the

spring semester. At Duke this amounts to approximately \$3,700.00 annually and is effective beginning in the fall of the following school year. No additional active service commitment is involved.

Qualified seniors may participate in a 35-hour Flight Instruction Program using light aircraft, and those who complete it may secure a civilian private pilot's license.

Students wishing to learn more about this program should address their inquiries to the Professor of Aerospace Studies, Duke University. Advance registration may be made in the manner prescribed by the University for other courses, or by contacting the Department of Aerospace Studies, Room 138, Social Science Building, during Freshman Week.

The Department of Naval Science offers a course of professional studies, complementary to other departmental curricula, leading, upon graduation, to a commission in the Navy or Marine Corps or their Reserves. Students selected in the annual national competition are enrolled in the NROTC College Scholarship Program which provides full tuition, books, and \$100 monthly allowance for up to four years. Other students select the College Program which provides only the \$100 monthly allowance in the junior and senior years. Draft exemption is provided where applicable, and provision exists for delay of active duty to attend graduate school. For additional details see the section on Financial Information and write to the Director of Undergraduate Studies, Department of Naval Science.

Romance Languages

When a student elects to concentrate in French or Spanish, he has decided to study in depth two important aspects of a particular culture—the language and the literature. At Duke he may elect either a language or literature major. Each channel will require courses in both language and literature, but in different proportions. Skill in

the use of the language will provide insights and appreciation of literary works, and conversely acquaintance with literary works will strengthen the language skills. Both language and literature will create appreciation and sympathy for the people whose culture they represent.

The study of a national literature must be made within the perspective of the humanities and history. It is important, then, to balance the major literary program by incorporating into it related study in history, fine arts, and other literature. In the language major related study is desirable in other languages and in linguistic theory.

Courses in Italian and Portuguese are offered by the department although neither may qualify as a major area of study.

Students may take advantage of Duke's association with the Vanderbilt Abroad programs or the Junior Year Abroad programs of other colleges and universities.

In the senior year, especially qualified students may pursue independent studies leading to Graduation with Distinction. Career opportunities for Romance language majors include such areas as government service, international agencies, export-import trade, international transportation, social service in minority areas, libraries, museums, and high school and college teaching.

Slavic Language and Literatures

Russian, a language spoken by over two hundred million people in the Soviet Union, ranks with English and Chinese as one of the major world languages. A knowledge of the language is indispensable in many positions in the federal government, private business, library work, and research institutions dealing with social or natural sciences. There is also a growing need for qualified Russian teachers on the high school and college level.

Practical advantages aside, the study

of Russian literature is richly rewarding as an esthetic and cognitive experience. The body of Russian literature is second to none in quality and serves to increase the student's understanding of Soviet culture.

Despite the popular misconception concerning the special difficulties of Russian, the language is a member of the Indo-European family of languages and is thus related to English with which it shares many cognates. The Russian alphabet can be mastered in about two weeks; Russian syntax is much less complicated than German or even English.

Russian majors take four years of language instruction including reading in the original Russian of literary and historical texts in the higher level language courses. A variety of courses on individual writers and literary periods exists in translation for majors and non-majors alike, although majors are required to do part of the reading in Russian in these courses. The emphasis is increasingly placed on the more relevant periods of the nineteenth and twentieth centuries. In addition to Russian literature, courses in Polish literature, the second most important Slavic literature, are offered in English translation.

Sociology

Sociology, as one of the developing social sciences, is involved not only in delineating human behavior, but with understanding it. Most sociological research is the result of intellectual curiosity, a desire to comprehend the general underlying conditions that produce, maintain, and transform social life. Sociologists seek to develop generalizations and theories from their inquiries into areas such as race relations, community structure, and unconventional behavior. Along with the other liberal arts, sociology enriches an understanding of man, his cultural patterns, and society.

The Department of Sociology offers a varied program to undergraduates who desire to specialize in the systematic study of human behavior. A gener-

al course introduces the student to the scope, concepts, and methods of sociology while preparing him for more specific study in areas such as industrial relationships, the family, urban studies, race relations, mass communications, and demography. Other special areas of study include social stratification, occupations and professions, social psychology, analysis of the life cycle, and collective behavior.

The department provides its majors with opportunities for learning the skills needed for sociological research. Courses are offered in methodology, sociological statistics, and sociological theory. Advanced undergraduates will be encouraged to participate actively in one of the research projects of the faculty.

Zoology

The complex nature of modern biology is reflected in the diversity of programs which are open to zoology majors. Students who are primarily interested in obtaining a broad, basic training in biology will find that a variety of courses in genetics, ecology, morphology, and physiology is available. Other students may specialize in such interdisciplinary subjects as physiological ecology, biochemical genetics, biophysics, and marine biology, or more strictly zoological subjects such as animal behavior and vertebrate biology. At the more advanced levels, students are encouraged to become involved in research, tutorials, and other special projects in their areas of specific interest. Junior and senior students may apply for a semester's study in the interdisciplinary program in the marine sciences at the Duke University Marine Laboratory in Beaufort, North Carolina.

Most of the recent progress in biology has come, not from the expansion of traditional fields of botany or zoology, but from the incorporation of ideas and techniques derived from the physical sciences and mathematics. As part of their biological training, most zoology majors need to become familiar with at least elements

of calculus, physics, and organic chemistry. The Zoology Department recommends introductory courses in these subjects and frequently recommends additional work in the appropriate areas.

With the permission of the Director of Undergraduate Studies in Zoology, students who score 3 or better on the CEEB Advanced Placement Program Examination in Biology, or who complete two years of high school biology may bypass the introductory course.

Special Programs

The Marine Sciences Program makes it possible for qualified juniors and seniors to live and study at the Duke University Marine Laboratory, Beaufort, North Carolina, during the spring term. The semester program consists of two courses and a seminar in addition to independent research. The design of the program permits a student to continue study at the Marine Laboratory during the summer either by participating in senior-graduate courses or by continuing the independent studies initiated during the spring term.

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Students interested in preparation for advanced work in genetics or wishing to take an interdisciplinary major in this area may do so with departmental approval.

Asian and Africian Languages—Chinese, Japanese, Hindu-Urdu, and Swahili—are offered for course credit, although no major is available in the field.

Linguistics courses may be taken as electives by advanced students, although no major is offered in the field.

The Institute for Policy Sciences and Public Affairs, established in September, 1971, will bring the resources of the University to bear on the train-

ing of students to deal with the problems of society. Duke students pursuing courses in economics, political science, sociology, law, psychology, and engineering may enroll concurrently in the Institute and participate in its sponsored internships.

Interdisciplinary and University Courses transcend departmental lines and vary somewhat from year to year. This year, the following courses are:

Introduction to the Civilizations of Southern Asia; Man and the Marine Environment; Themes in Contemporary Jewish Thought; The Contemporary Woman: History and Prospects; Ecology and Social Action; The Changing South; Comparative Politics: Western Europe; Science, Society, and Education; Seminar in the History of Social Sciences; Commonwealth Seminar.

House Courses provide a flexible

supplement to formal classroom instruction by allowing living groups, with the approval of the University curriculum committee, to conduct a semester course within the more informal atmosphere of a dormitory and to tailor this course to the specialized educational interests and needs of living group members. Some of the house courses offered this year are:

Cinematic Criticism; Investments; Group Dynamics; Sex Roles & Socialization; Interpersonal Perception; Current Economic Problems with Special Reference to "The New Nixonomics"; Contemporary Science-Fiction; Other Worlds: a Study of Modern English and American Utopian Fiction; Elementary Thermodynamics; Masterpieces of Twentieth Century Music; Extremist Political Literature in a Religious Context; A History of American Women in the Twentieth Century.

Officers of the Administration

General Administration

Terry Sanford, J.D., LL.D., D.H., L.H.D., D.P.A., *President*
John O. Blackburn, Ph.D., *Chancellor*
Frederic N. Cleaveland, Ph.D., *Provost*
Charles B. Huestis, *Vice President for Business and Finance*
William G. Anlyan, M.D., *Vice President for Health Affairs*
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Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*
Harold Lewis, Ph.D., *Vice Provost and Dean of the Faculty*
John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*
James L. Price, Jr., Ph.D., *Vice Provost and Dean of Undergraduate Education*
*Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*
Thomas F. Keller, Ph.D., *Vice Provost*
Benjamin Edward Powell, Ph.D., *Librarian*
J. Peyton Fuller, A.B., *Controller*
Clark R. Cahow, Ph.D., *University Registrar*
Rufus H. Powell, LL.B., *Secretary of the University*
Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Assistant Treasurer*
Victor A. Bubas, B.S., *Assistant to the President*
A. Kenneth Pye, LL.M., *University Counsel*

*On leave through August 31, 1972.

Undergraduate Admissions

Robert H. Ballantyne, Ed.D., *Director of Undergraduate Admissions*
Everett Broadus Weatherspoon, A.B., *Director of Financial Aid*
I. Croom Beatty, IV, A.B., *Assistant Director of Financial Aid*
Robert T. Simpson, M.Ed., *Associate Director*
Susan P. Robell, A.B., *Associate Director*
Nancy M. Murray, A.B., *Assistant Director*
William P. Eyerman, M.A., *Assistant Director*
Thurletta M. Brown, A.B., *Minority Admissions Counselor*
Raymond Fred Zuker, A.B., *Admissions Counselor*
Kathlynn C. Ciompi, M.Ed., *Admissions Counselor*

Photo Credits

Ed Akel: 24 bottom left.

Tim Baker: 33 right, 35 top right.

Jack Bernetich: 40 bottom.

J. T. Gilchrist: 26 bottom, 27 right, 29 bottom left, 35 top, 37 top left.

Jim Sparks: 48 top left.

Jim Williams: 17 left, 23 top left, 36 left.

Thad Sparks and Jim Wallace, *University photographers*: 5, 13, 15, bottom left, top left, 16 bottom, 17 right, 18 bottom right, 19 top right, 23 bottom right, 26 top, 29 top, bottom right, 32 top, middle, 34 bottom, 37 bottom right, 40 top right, 41 right, 42 left, 46 right, 49 top left.

Carolyn H. Vaughan: Cover, 14, 15 bottom right, middle left, 16 top, 18 left, 19 bottom, 21, 22 top right, top left, 23 top right, 24 top right, top left, 26 middle, 27 left, 28, 29 middle, 32 bottom, 33 bottom, 34 top, 35 bottom, 36 right, 37 top right, 40 top left, 41 left, 42 right, 45, 46 left, 47 right, 48 top right, 49 bottom right, top right, 51.

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MAP OF DUKE UNIVERSITY

East Campus

- | | |
|---------------------------|------------------------|
| A Baldwin Auditorium | O Pegram House |
| B Bassett House | P Duke Press |
| C Brown House | Q Infirmary |
| D Union Building | R Ark |
| E Faculty Apartments | S Crowell Building |
| F Art Museum, Geology | T Epworth Inn |
| G Aycock House | U Gilbert-Addams House |
| H East Duke Building | V Southgate Hall |
| I West Duke Building | W Campus Center |
| J Jarvis House | X Woman's College |
| K Carr Building | Y Asbury Building |
| L Giles House | Z Bivins Building |
| M Woman's College Library | AA Art Building |
| N Alspaugh House | BB Branson Building |



West Campus

- | | | | |
|--------------------------|--------------------------|----------------------|-----------------------------|
| A Duke Chapel | H Hospital Main Entrance | O Craven Quadrangle | V Card Gymnasium |
| B Divinity School | I Gerontology, D & T, | P Wannamaker Hall | W Indoor Stadium |
| C Gray Building | J Clinical Research | Q Crowell Quadrangle | X School of Law |
| D Perkins Library | K Duke Hospital | R Clock Tower Court | Y Gross Chemical Laboratory |
| E Language Center | L Sociology, Psychology | S Kilgo Quadrangle | Z Biological Sciences |
| F Old Chemistry Building | M Social Sciences | T Union Building | AA Plant Environment |
| G Davison Building | N Allen Building | U Flowers Building | Laboratory |
| School of Medicine | FE Few Quadrangle | Page Auditorium | BB Physics Building |
| | | | CC Nuclear Laboratory |
| | | | DD School of Engineering |
| | | | EE Army Research |
| | | | FF Medical Center Research |
| | | | Buildings |
| | | | GG Nanaline H. Duke Medical |
| | | | Sciences Building |
| | | | HH Warehouse, Shop |
| | | | II Bell Building |
| | | | JJ Hanes House |
| | | | School of Nursing |
| | | | KK Hanes House Annex |
| | | | LL Pickens Rehabilitation |
| | | | Center |
| | | | MM Graduate Center |
| | | | NN Alumni House |
| | | | OO Commonwealth-Studies |
| | | | Center |
| | | | PP Personnel Office |
| | | | QQ International House |
| | | | RR Personnel Office |
| | | | SS Education Improvement |
| | | | Program, |
| | | | A Better Chance Program |
| | | | TT International Studies |
| | | | Center |
| | | | UU Campus Stores Office |
| | | | VV Office of Institutional |
| | | | Advancement |
| | | | WW Information Services |
| | | | Visitors Bureau |
| | | | XX Admissions Office |
| | | | YY Edens Quadrangle |
| | | | ZZ Wade Stadium |





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The School of Law



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Calendar of the Law School

1972

- August**
28 Monday—Registration of first year students 9:00 a.m. to 12:00 p.m. Registration for second and third year students and Orientation for first year students 1:30 p.m. to 5:00 p.m.
29 Tuesday, 8:00 a.m.—Classes begin
- November**
22 Wednesday, 6:00 p.m.—Thanksgiving holidays begin
27 Monday, 8:00 a.m.—Classes resume
- December**
6 Wednesday—Fall semester classes end
11 Monday, 8:00 a.m.—Fall semester examinations begin
21 Thursday, 6:00 p.m.—Fall semester examinations end

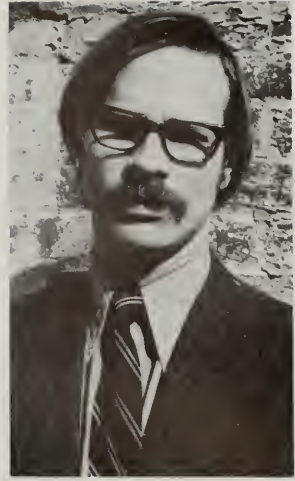
1973

- January**
11 Thursday, 8:00 a.m.—Spring semester classes begin
- March**
17 Saturday, 1:00 p.m.—Spring vacation begins
26 Monday, 8:00 a.m.—Classes resume
- April**
25 Wednesday, 6:00 p.m.—Spring semester classes end
30 Monday, 8:00 a.m.—Spring semester examinations begin
- May**
9 Wednesday, 6:00 p.m.—Spring semester examinations end
12 Saturday—Commencement begins
13 Sunday—Commencement: Baccalaureate Service and Graduation Exercises

Law Faculty

Joseph C. Bell, A.B., A.M., LL.B., *Assistant Professor of Law*

A.B. 1962, University of Colorado; A.M. in Economics 1965, Harvard University; LL.B. 1968, Yale University; Consultant, Cabinet Committee on Education, Washington D. C., summer 1970; Consultant, Office of Emergency Preparedness, Washington, D.C., summer 1970; Legal Assistant, Cabinet Task Force on Oil Import Control, Washington, D. C., 1960-1970; Assistant to Professor Neustadt, Kennedy School of Government, Cambridge, Massachusetts, spring 1969; Teaching Fellow, Department of Economics, Harvard University, 1968-1969; Summer Associate, 1967 in New York; Legal Editor, Continuing Education of the Bar, California, fall of 1966; Economist, Office of International Tax Affairs, summer 1966 and Office of Tax Analysis, summer 1965; Treasury Department, Washington, D. C.; Program Coordinator, United States Youth Council, New York, summer 1964; National Field Representative Collegiate Council for the United Nations, New York, 1962-1963. Assistant Professor of Law, Duke University, since 1972.



William D. Caffrey, B.S., M.A., LL.B., *Adjunct Professor of Law*

B.S. 1950, Indiana State Teacher's College; M.A. 1954, George Washington University; LL.B. 1958, Duke University. General practice 1958 to date. Adjunct Professor of Law, Duke University, since 1968.



George C. Christie, A. B., J.D., S.J.D., Diploma in International Law, *Professor of Law*

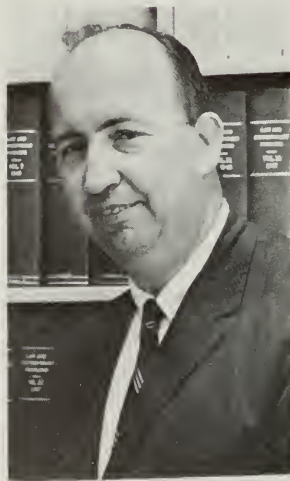
A.B. 1955, J.D. 1957, Columbia University; S.J.D. 1966, Harvard University, Diploma in International Law, 1962, Cambridge University. General practice, 1958-1960; Ford Fellow, Harvard Law School, 1960-1961; Fulbright Scholar, Cambridge University, 1961-1962; Associate Professor of Law, University of Minnesota, 1962-1965; Professor of Law, University of Minnesota, 1965-1966; Assistant General Counsel for the Near East and South Asia, Agency for International Development, 1966-1967. Professor of Law, Duke University, since 1967.





Walter E. Dellinger III, A.B., LL.B., *Professor of Law*

A.B. 1963, University of North Carolina; LL.B. 1966, Yale University, Associate Professor of Law, University of Mississippi, 1966-1968; Law Clerk to Associate Justice Hugo L. Black, U.S. Supreme Court, 1968-1969. Associate Professor of Law, Duke University, 1969-1972. Professor of Law, Duke University, since 1972.



Robinson Oscar Everett, A.B., LL.B., *Professor of Law and Associate Editor, Law and Contemporary Problems*

A.B. 1947, LL.B. 1950, Harvard University. Assistant Professor of Law, Duke University, 1950-1951; Military Service, Legal Officer in Air Force, 1951-1953; Commissioner of the U.S. Court of Military Appeals, 1953-1955; general practice, since 1955; U.S. Senate Subcommittee on Constitutional Rights of the Committee on the Judiciary, Counsel, 1961-1964, Consultant, since 1966; Commissioner on Uniform Laws, since 1962; member of American Law Institute, since 1966. Visiting Associate Professor of Law, Duke University, 1956-1961; Adjunct Professor of Law, 1961-1966; Professor of Law since 1967.



Joel L. Fleishman, A.B., J.D., M.A., LL.M., *Associate Professor of Law, Vice Chancellor for Public Policy Education and Research and Director of the Institute of Policy Sciences and Public Affairs*

A.B. 1955, J.D. 1959, M.A. 1959, University of North Carolina at Chapel Hill; LL.M. 1960, Yale University. Assistant to the Director, Walter E. Meyer Research Institute of Law, 1960-1961, Yale Law School; Legal Assistant to the Governor of North Carolina, 1961-1965; Director, 1965-1967, Yale Summer High School; Associate Provost for Urban Studies and Programs, Yale University 1967-1971; Associate Director for Program Development, Institute of Social Science, Yale University, 1969-1971. Associate Professor of Law, Duke University, since 1971.

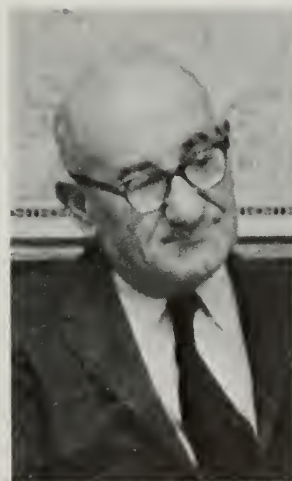
George W. Gillmor, B.S., B.A., LL.B., *Assistant Professor of Law*

B.S., B.A. 1965, Boston University; LL.B. 1967, Boston University School of Law, Editor-in-Chief, *Law Review*; private practice since 1967 in Chicago. Assistant Professor of Law, Duke University, since 1972.



Kazimierz Grzybowski, M.L.L., D.L.L., S.J.D., *Professor of Law and Adjunct Professor of Political Science*

M.L.L. 1931; Doctor of Law and Political Science, 1934, University of Lwow; S.J.D. 1933, Harvard. Associate Professor, School of Law and Graduate School of Diplomacy, University of Lwow, 1936-1939; Judge of District Court of Lwow; Military Service, 1939-1948; Editor, Law Library, Library of Congress, Washington, D. C., 1951-1960; Consultant, Social Science Division, Rand Corporation, Santa Monica, California, 1960-1962; Visiting Professor, Michigan Law School, 1961-1962; Yale Law School, 1962-1963; Leiden University, Leiden, the Netherlands, 1963-1964. Visiting Professor, Strasbourg University, Strasbourg, France, 1967. Senior Research Associate, Rule of Law Research Center, Duke University Law School, since 1964.



William Burnett Harvey, A.B., J.D., *Visiting Professor of Law*

A.B. 1943, Wake Forest University; J.D. 1948, University of Michigan; Associate Editor, *Michigan Law Review*; Admitted to the Bar of the District of Columbia, 1949; Postdoctoral Fellow, University of Heidelberg; private practice, 1949-1951; Assistant Professor, University of Michigan, 1951-1954, Associate Professor, 1954-1957, Professor, 1957-1966; Dean and Professor, University of Ghana, 1962-1964; Dean and Professor of Law and Political Science, Indiana University, since 1966. U.S. Navy, 1943-1946, Lt.; *Law and Social Change in Ghana*, 1966; Member, Fellow African Studies Association; African Law Association, American Law Institute; Coif. Consultant, International Legal Center, since 1967; Visiting Professor of Law, Duke University, since 1972.





Clark C. Havighurst, A.B., J.D., *Professor of Law*

A.B. 1955, Princeton University; J.D. 1958, Northwestern University. Military Service, 1958-1960; Research Associate, Small Business Studies, Duke University, 1960-1961; general practice, 1961-1964; Visiting Associate Professor of Law, Stanford University, spring, 1968; Visiting Professor of Law, Northwestern University, spring, 1970; Editor, *Law and Contemporary Problems*, 1965-1970; Director, Committee on Legal Issues in Health Care, since 1969. Associate Professor of Law, Duke University, 1964-1968, Professor of Law, since 1968.



Richard D. Hobbet, B.A., J.D., *Professor of Law*

B.A. 1949, J.D. 1951, University of Iowa. Trial Attorney, U.S. Internal Revenue Service, 1951-1954; general practice, 1954-1967; Department Editor, *Journal of Taxation*, since 1963. Professor of Law, Duke University, since 1968.



Igor I. Kavass, LL.B., *Professor of Law and Law Librarian*

LL.B. 1956, University of Melbourne; private practice, 1956-1959; Sr. Lecturer, University of Adelaide, 1959-1964; Sr. Lecturer, University of Melbourne, 1964-1967; Visiting Professor of Law, University of Alabama, 1966-1967; Associate Professor, Monash University, 1967-1968; Professor and Librarian, University of Alabama, 1968-1970; Professor and Librarian, Northwestern University, 1970-1972. Professor of Law and Law Librarian, Duke University, since 1972.

David L. Lange, B.S., LL.B., *Associate Professor of Law*

B.S. 1960, LL.B. 1964, University of Illinois. Production Coordinator, TV-Motion Picture Dept., University of Illinois, 1959-1961; General Counsel, Mass Media Task Force, National Commission on the Causes and Prevention of Violence, 1968-1969; private practice, 1964-1970. Visiting Associate Professor of Law, Northwestern University School of Law, Summer 1972. Associate Professor of Law, Duke University since 1971.



**Arthur Larson, A.B., M.A., B.C.L., J.D., D.C.L., LL.D., L.H.D.,
*Professor of Law and Director of Rule of Law Research Center***

A.B. 1931, LL.D. 1953, Augustana College; M.A. (Juris.) 1938; B.C.L. 1957, D.C.L. 1957, Oxford University; Fellow of Pembroke College, Oxford. General practice, 1935-1939; Assistant Professor of Law, University of Tennessee, 1939-1941; Division Counsel, Office of Price Administration, 1941-1944; Chief, Scandinavian Branch Foreign Economic Administration, 1944-1945; Associate Professor, Cornell Law School, 1945-1948; Professor of Law, Cornell Law School, 1948-1953; Fulbright Fellowship, London School of Economics, 1952; Dean, University of Pittsburgh Law School, 1953-1954; Knapp Professor of Law, University of Wisconsin School of Law, 1968; Undersecretary of Labor, 1954-1956; Director, U. S. Information Agency, 1956-1957; Special Assistant to the President, 1957-1958; Special Consultant to the President, 1958-1961; Consultant to the President on Foreign Affairs, 1964-68; Consultant to the State Department on International Organizations, 1963-1969. Professor of Law and Director of Rule of Law Research Center, Duke University, since 1958.



Elvin R. Latty, B.S., J.D., J.Sc.D., *William R. Perkins Professor of Law and Dean Emeritus*

B.S. 1923, Bowdoin College; J.D. 1930, University of Michigan; J.Sc.D. 1936, Columbia University. Instructor in Romance Languages, University of Vermont, 1923-1927; general practice, 1930-1933; Special Fellow, Columbia University, 1933-1934; Associate Professor of Law, University of Kansas, 1934-1935; Professor of Law, University of Missouri, 1935-1937; Visiting Professor of Law, George Washington University, summer, 1937, Stanford University, summer 1938, University of North Carolina, summer, 1942, 1947, 1949, 1956, University of Texas, summer, 1951, University of Puerto Rico, spring, 1968, University Florida, summer, 1970; Fulbright lecturer, University of Pavia, Italy, 1954; Special Assistant to the American Ambassador, Caracas, 1942-1943; Acting Assistant Chief, Foreign Funds Control Division, U. S. Department of State, 1943. Professor of Law, Duke University, 1937-1966, Dean of School of Law, 1958-1966; William R. Perkins Professor of Law and Dean Emeritus, since 1966.





Michael E. Levine, B.A., LL.B., *Visiting Professor of Law*

B.A. 1962, Reed College; LL.B. 1965, Yale University. Attorney, Civil Aeronautics Board, Washington, D.C., 1965-1966; Special Assistant Task Force on Economic Growth and Opportunity, Washington, D.C., 1966-1967; Fellow in Law and Economics, University of Chicago, 1967-1968; Assistant Professor, University of Southern California, 1968-1970; Associate Professor, since 1970. Visiting Professor of Law, Duke University, since 1972.



Charles H. Livengood, Jr., A.B., J.D., *Professor of Law*

A.B. 1931, Duke University; J.D. 1934, Harvard University. General practice, 1934-1940, 1945-1948; Regional Attorney for the Seventh Region, Wage and Hour Division, U. S. Department of Labor, 1940-1941; Chief of the Wage-Hour Section, Office of the Solicitor of Labor, 1941-1942; Visiting Professor of Law, University of North Carolina, summer 1948, 1967-1968; George Washington University, summer 1949, 1956; Fulbright Lecturer, University of Sydney, Australia, 1958-1959; member, American Law Institute, since 1947; Consultant, U.S. Senate Subcommittee on Labor-Management Relations, 1950; Associate Editor *Journal of Legal Education*, 1951-1952; public member, Wage Stabilization Board, Region III, 1952-1953; member National Academy of Arbitrators, since 1953; Chairman, N. C. General Statutes Commission, since 1970, member since 1966; Secretary, Section on Labor Relations Law, American Bar Association, 1967-1968. Lecturer in Law, Duke University, 1946-1948; Associate Professor of Law, 1948-1951; Professor of Law, since 1951.



Patricia H. Marschall, B.A., LL.B., LL.M., *Professor of Law*

B.A. 1953, LL.B. 1955, University of Texas; LL.M. 1968, Harvard University. Private practice, San Angelo, Texas, 1962-1965; Municipal Judge, San Angelo, Texas, 1965-1967; Research Assistant, Harvard, 1968-1969; Associate Professor, Wayne State University Law School, 1969-1971; Visiting Associate Professor of Law, University of Iowa, summer 1970; University of Texas, summer 1971. Visiting Associate Professor of Law, Duke University 1971-1972; Professor of Law since 1972.

Forest Hodge O'Neal, A.B., J.D., J.S.D., S.J.D., *James B. Duke Professor of Law and Editor, Corporate Practice Commentator*

A.B. 1938, J.D. 1940, Louisiana State University; J.S.D. 1949, Yale University; S.J.D. 1954, Harvard University. Associate Professor of Law, University of Mississippi, 1945-1946; Professor of Law, University of Mississippi, 1946-1947; Acting Dean and Professor of Law, Walter F. George School of Law, Mercer University, 1947-1948; Dean, Walter F. George School of Law, Mercer University, 1947-1956; Professor of Law, Vanderbilt University, 1956-1959; Visiting Professor of Law, New York University, 1957-1958; Editor, *Corporate Practice Commentator*, since 1959; Member, Board of Editors, *American Bar Association Journal*, since 1971; Visiting Professor of Law, University of Michigan, summer 1965, University of Minnesota, fall 1965. Professor of Law, Duke University, since 1959; Dean, School of Law, 1966-1968.



Joel Francis Paschal, A.B., LL.B., A.M., Ph.D., *Professor of Law*

A.B. 1935, LL.B. 1938, Wake Forest College; A.M. 1942, Ph.D. 1948, Princeton University. Instructor in Law, Wake Forest College, 1939-1940; USNR, 1942-1946; Instructor, Princeton University, 1946-1947; Research Director, North Carolina Commission for the Improvement of the Administration of Justice, 1947-1949; general practice, 1949-1954; Visiting Professor of Law, Duke University, 1952-1953, University of North Carolina, spring semester, 1956, fall semester, 1966. Associate Professor of Law, Duke University, 1954-1959; Professor of Law, since 1959.



A. Kenneth Pye, B.A., J.D., LL.M., *Professor of Law and University Counsel*

B.A. 1951, University of Buffalo; J.D. 1953, LL.M. 1955, Georgetown University. Military service, 1953-1955; Professor of Law, Georgetown University, 1955-1956, Associate Dean, 1961-1966; Visiting Professor of Law, Johann Wolfgang Goethe University, Germany, summer 1959, Duke University, spring, 1965, University of North Carolina, spring, 1968, Banaras Hindu University, India, 1966-1967; Trustee, Legal Aid Agency for District of Columbia, 1963-1966; Chairman, Board of Directors, District of Columbia, Neighborhood Legal Services Project, 1963-1966; Program Specialist in Legal Education, The Ford Foundation (India), 1966-1967; Associate Director, A.A.L.S. Orientation Program in American Law, summer, 1965, Director, 1967-1968; Project Co-Director of the ABA Commission on Campus Government and Student Dissent, 1969-1970; Member, American Law Institute; Executive Committee, Association of American Law Schools, since 1971; Member, North Carolina Criminal Code Revision Commission, since 1970; North Carolina Committee on Goals and Policies, 1972. Professor of Law, Duke University, since 1966, Dean, 1968-1970, Chancellor of Duke University, 1970-1971, University Counsel, since 1971.





Frank T. Read, B.S., J.D., *Professor of Law and Associate Dean*

B.S. 1960, Brigham Young University; J.D. 1963, Duke University. Private practice, 1963-1965; corporate practice, 1965-1968. Assistant Dean and Assistant Professor of Law, Duke University, 1968-1970; Associate Professor of Law and Assistant Dean, 1970-1972; Professor of Law and Associate Dean, since 1972.



Melvin G. Shimm, A.B., LL.B., *Professor of Law and Faculty Adviser, Duke Law Journal and Legal Research Program*

A.B. 1947, Columbia University; LL.B. 1950, Yale University. Second Lt. FA(AUS), 1943-1946; general practice, 1950-1951; Counsel, Wage Stabilization Board 1951-1952; Bigelow Fellow, University of Chicago Law School, 1952-1953; Editor, *Law and Contemporary Problems*, 1955-1961; Editor, *Journal of Legal Education*, 1955-1963; American Editor, *Journal of Business Law*, 1955-1961; Visiting Associate Professor of Law, New York University, summer, 1957; Visiting Professor of Law, University of Southern California, summer, 1965, University of North Carolina, spring, 1970; faculty, A.A.L.S. Orientation Program in American Law, summer, 1966, Director, 1968-1970; Senior Legal Consultant, The Brookings Institution, 1965-1968. Assistant Professor of Law, Duke University, 1953-1956; Associate Professor of Law, 1956-1959; Professor of Law, since 1959.



Joseph T. Sneed, BB.A., LL.B., S.J.D., LL.D., *Professor of Law and Dean*

BB.A. 1941, Southwestern University; LL.B. 1947, University of Texas; S.J.D. 1958, Harvard; LL.D. 1968, Southwestern University. Instructor, University of Texas, 1947, Assistant Professor of Law 1947-51, Associate Professor 1951-54, Professor of Law 1954-57; Professor, Cornell, 1957-62; Professor, Stanford, 1962-1971. Dean and Professor of Law, Duke University, since 1971.

Bertel M. Sparks, B.S., LL.B., LL.M., S.J.D., *Professor of Law*

B.S. 1938, Eastern Kentucky University; LL.B. 1948, University of Kentucky; LL.M. 1949, S.J.D. 1955, University of Michigan. Special Agent, U.S. Army Counterintelligence Corps, 1941-1945; Instructor of Law, New York University, 1949-1950, Assistant Professor of Law, 1950-1952; Associate Professor of Law, 1952-1954, Professor of Law, 1954-1967; Visiting Professor of Law, University of Michigan, summer, 1956, University of Kentucky, summer 1957. Visiting Professor of Law, Duke University, 1966-1967; Professor of Law, since 1967.



Otto G. Stolz, B.A., LL.B., *Associate Professor of Law*

B.S. 1963, Stevens Institute of Technology; LL.B. 1966, University of Virginia Law School. Editorial Board of *Virginia Law Review*; private practice, 1968-1971 in California; United States Department of Treasury, (Washington, D.C.), 1971. Associate Professor of Law, Duke University, since 1972.



William W. Van Alstyne, B.A., J.D., *Professor of Law*

B.A. 1955, University of Southern California; J.D. 1958, Stanford University; Certificate, Hague Academy of International Law, 1961. California Department of Justice, 1958; U.S. Department of Justice, 1958-1959; Assistant Professor, Ohio State University College of Law, 1959-1961; Associate Professor, 1961-1964, Professor, 1964-1965; Visiting Associate Professor of Law, Duke University, spring semester, 1964, U.C.L.A., summer, 1964; Senior Fellow, Yale Law School, 1964-1965; faculty, Orientation Program in American Law, Princeton University, summer, 1967; Visiting Professor of Law, University of Mississippi, summer, 1968, Stanford University, spring, 1969. University of Denver Law Center, summer, 1969; Project Co-Director of the ABA Commission on Campus Government and Student Dissent 1969-1970; General Counsel, American Association of University Professors, since 1968; ACLU National Board of Directors, since 1970. Professor of Law, Duke University, since 1965.





John C. Weistart, A.B., J.D., *Associate Professor of Law and Editor, Law and Contemporary Problems*

A.B., 1965, Illinois Wesleyan University; J.D. 1968, Duke University. Law Clerk to Honorable Walter V. Schaefer, Supreme Court of Illinois, 1968-1969; Editor, *Law and Contemporary Problems*, since 1970. Associate Professor of Law, Duke University, since 1972.

Joseph D. Harbaugh, B.S., LL.B., LL.M., *Associate Professor of Law*

B.S. 1961, St. Joseph's College; LL.B. 1964, University of Pittsburgh; LL.M. 1965, Georgetown University. Prettyman Fellow, Georgetown University, 1964-65; Special Assistant, Hon. William J. Green, M. C., 1964-65; Chief Public Defender, Connecticut Circuit Court, 1965-68; Associate Professor of Law, Duke University, since 1972. On leave, 1972. (Not pictured.)

Law Staff

Research Associate—Rule of Law Research Center

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Charlie R. Howell, *Assistant to the Dean*

Laverne Seagroves, *Administrative Assistant*

Jo Ann Charlesworth, *Secretary to the Dean*

Emeriti

W. Bryan Bolich, A.B., B.A. (Juris), M.A., B.C.L., *Professor of Law Emeritus*

A.B. 1917, Duke University; Duke University Law School, 1919-1921; B.A. (Juris.) 1923, B.C.L. 1924, M.A. 1928, Oxford University. General practice, 1924-1927; Member North Carolina House of Representatives, 1927; Legal Attache American Embassy, Rome, 1950; Visiting Professor of Law, University of North Carolina, summer, 1951, 1955; University of Houston, spring semester, 1957; Professor of Law, Duke University, 1927-1966; Professor Emeritus of Law, since 1966.

John S. Bradway, A.B., A.M., LL.B., LL.D., *Professor Emeritus of Law*

A.B. 1911, A.M. 1915, LL.D. 1957, Haverford College; LL.B. 1914, University of Pennsylvania. General practice, 1914-1929; Legal Aid Society of Philadelphia, 1914-1920; Chief Counsel, Philadelphia Legal Aid Bureau, 1920-1922; Secretary, National Association of Legal Aid Organizations, 1923-1940; President, 1940-1942; Visiting Professor of Law and Director of the Legal Aid Clinic, University of Southern California, summer, 1928; Professor of Law and Director of the Legal Aid Clinic, University of Southern California, 1929-1931; Vice-president, N.C. Bar Association, 1945-1946; Visiting Professor, University of North Carolina School of Social Work, 1949-1959. Professor of Law and Director of the Legal Aid Clinic, Duke University, 1931-1959; Professor Emeritus of Law, since 1959.

Edwin C. Bryson, LL.B., *Professor Emeritus of Law*

University of North Carolina, 1922-1925; Duke University, 1932-1933; LL.B. 1937, University of Oregon. General practice, 1927-1930. Assistant to Duke University Legal Aid Clinic, 1931-1947. Duke University Counsel, 1945-1971; Associate Professor of Law 1947-1954; Professor of Law, 1954-1971; Professor Emeritus of Law, since 1971.

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John O. Blackburn, Ph.D., *Chancellor*

Frederic N. Cleaveland, Ph.D., *Provost*

Charles B. Huestis, *Vice President for Business and Finance*

William G. Anlyan, M.D., *Vice President for Health Affairs*

Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*

Gerhard Chester Henricksen, M.A., C.P.A., *Vice President and Treasurer*

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*Craufurd David Goodwin, Ph.D., *Vice Provost and Director of International Programs*

Thomas F. Keller, Ph.D., *Vice Provost*

Joel L. Fleishman, LL.M., *Vice Chancellor for Public Policy Education and Research;*

Director of Institute for Policy Sciences and Public Affairs

Benjamin Edward Powell, Ph.D., *Librarian*

Clark R. Cahow, Ph.D., *University Registrar*

J. Peyton Fuller, A.B., *Controller*

Rufus H. Powell, LL.B., *Secretary of University*

Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Assistant Treasurer*

Victor A. Bubas, B.S., *Assistant to the President*

A. Kenneth Pye, LL.M., *University Counsel*

*Leave of Absence 1971-72.



General Information

Law School: Its History, Purpose, and Methods

Duke University is built around Trinity College, which goes back in its origin to the year 1838-1839, when Union Institute was founded. The teaching of law as part of a cultural education constituted the beginning of legal instruction in this institution in 1850. Professional education for law began in 1868 when the Department of Law of Trinity College was established. Duke's Centennial year of professional legal education was celebrated at Law Day 1968.

The modern School of Law was founded in 1904 upon an endowment established by James B. and Benjamin N. Duke. Dr. Samuel Fox Mordecai, distinguished lawyer, scholar, and teacher, organized the School and was its Dean until his death in 1927. The establishment of this school set a new standard in southern legal education, being the first law school in the area to require the completion of two years of college work as an entrance requirement and pioneering in adoption of the case method as the basis of instruction. At an early date three years of resident study was required for the LL.B. degree.

The Law School shared in the expansion incident to the founding of Duke University in 1924. In 1930, with removal to the newly completed law building and the appointment of an enlarged faculty and staff, the Duke Law School entered a new stage of development. The School was reorganized and the curriculum and professional activities were greatly broadened, with the purpose of establishing in the Southeast a progressive Law School of national scope and character.* Throughout its history the Law School has emphasized quality rather than quantity in its student body.

*Since the reorganization of the School in 1930, the following scholars have served as Deans or Acting Deans: Justin Miller, 1930-1934; H. Claude Horack, 1934-1947; Harold Shepherd, 1947-1949; Charles L. B. Lowndes, 1949-1950; Joseph A. McClain, Jr., 1950-1956; Dale F. Stansbury, 1956-1957; Elvin R. Latty, 1957-1966; F. Hodge O'Neal, 1966-1968; A. Kenneth Pye, 1968-1970; Joseph T. Sneed, since 1971.

The curriculum of the Law School provides thorough preparation for the practice of law in any state. Its graduates have been admitted to the bar throughout the nation. Opportunities for specialization in particular branches of the law are afforded.

In carrying out the trust imposed by the indenture establishing the Duke Endowment, the Law School seeks to have the student acquire knowledge and comprehension not only of legal doctrine, but also of the judicial process and of the social, economic, and political problems with which law and lawyers must deal. The method of instruction employed compels analysis of judicial opinions and inquiry into the nonlegal as well as the legal considerations which underlie them. In appropriate courses, special consideration is given to the work of the legislative and administrative agencies of government. In recognition of the increasing importance of the role of the lawyer in representing private interests before government agencies and in government service, a broad program is offered in the public law field. Opportunity for creative student work is provided by seminar courses and supervised individual study and research. Courses and seminars dealing with consumer protection, law and poverty, race relations, urban problems, criminal procedure, land use planning, and air pollution bring the student in contact with major problems facing the country.

Practical training is not left for the first years of practice. A carefully integrated series of courses is designed to give students actual experience in the work of lawyers. Legal research and writing, moot court work, and procedure in the first year are followed in the second and third years by courses, seminars, and co-curricular activities emphasizing trial techniques, legal planning and drafting, professional responsibility, and legal aid work. A student bar association affords a means whereby the student may become acquainted with the professional organizations through which a lawyer may and should contribute to the well-being of his profession and society.

From the Indenture of James B. Duke

"I have selected Duke University as one of the principal objects of this trust because I recognize that education, when conducted along sane and practical, as opposed to dogmatic and theoretical, lines, is, next to religion, the greatest civilizing influence. I request that this institution secure for its officers, trustees and faculty men of such outstanding character, ability and vision as will insure its attaining and maintaining a place of real leadership in the educational world, and that great care and discrimination be exercised in admitting as students only those whose previous record shows a character, determination and application evincing a wholesome and real ambition for life. And I advise that the courses at this institution be arranged, first, with special reference to the training of preachers, teachers, lawyers and physicians, because these are most in the public eye, and by precept and example can do most to uplift mankind. . . ."



Resources for Study

The Law Building. The new Law School building was completed and occupied in September, 1962. Located just off the Gothic core of the West (main) Campus, the building is of modified Georgian architecture with contemporary overtones. It reflects a notable characteristic of the School—a high ratio of facilities to students admitted. Despite long-range plans to keep the student body moderate in size, the general spaciousness, number of classrooms and seminar rooms, seating capacity in library reading room, library stack spaces, student carrels, student lockers, four student lounge areas, faculty offices, quarters for legal publications, special quarters for institutional studies and legal aid programs, and courtroom are of proportions ordinarily associated with a far larger student body. The building itself consists of a classroom wing and a library and administrative wing, with faculty offices and student activities in both areas.

The Law Library. The Law Library is one of the largest law collections in the country. It consists of American and English statutory and case law; collections of international, comparative, and foreign law materials; treatises; digests; encyclopedias; the various selected case series; a comprehensive collection of legal periodicals; and publications in the fields of history, economics, government, and other social sciences, supplemental to the strictly legal materials. The library receives every current legal periodical of general interest printed in the English language and 80 foreign periodicals, and maintains an up-to-date collection of legislation of the United States and of every state.

There are many thousands of additional volumes of a legal nature in the new Perkins Library, as well as the general collection of over two million volumes, to all of which the law students and faculty have convenient access.

The library reading room is unusually spacious in relation to the size of the student body, as are the book stacks interspersed with reading tables. Almost the entire student body can be accommodated in the library at one sitting when the combined seating capacity of the main reading room, the student carrels, and the interstack tables are utilized.



Rule of Law Research Center. In the fall of 1958, the Duke Law School established its Rule of Law Research Center, with Professor Arthur Larson as its Director.

Among the purposes of the center are long-range and current studies and publications bearing on the settlement of international disputes and the achievement of peaceful change under law. Typical projects include several recently published books: *Sovereignty with the Law*, *Propaganda: Toward Disarmament in the War of Words*, *The United Nations and the Rule of Law*, *China and International Agreements*, *Soviet Public International Law*, *Population and Law: A Study of the Relations Between Population Problems and the Law*.

Publications

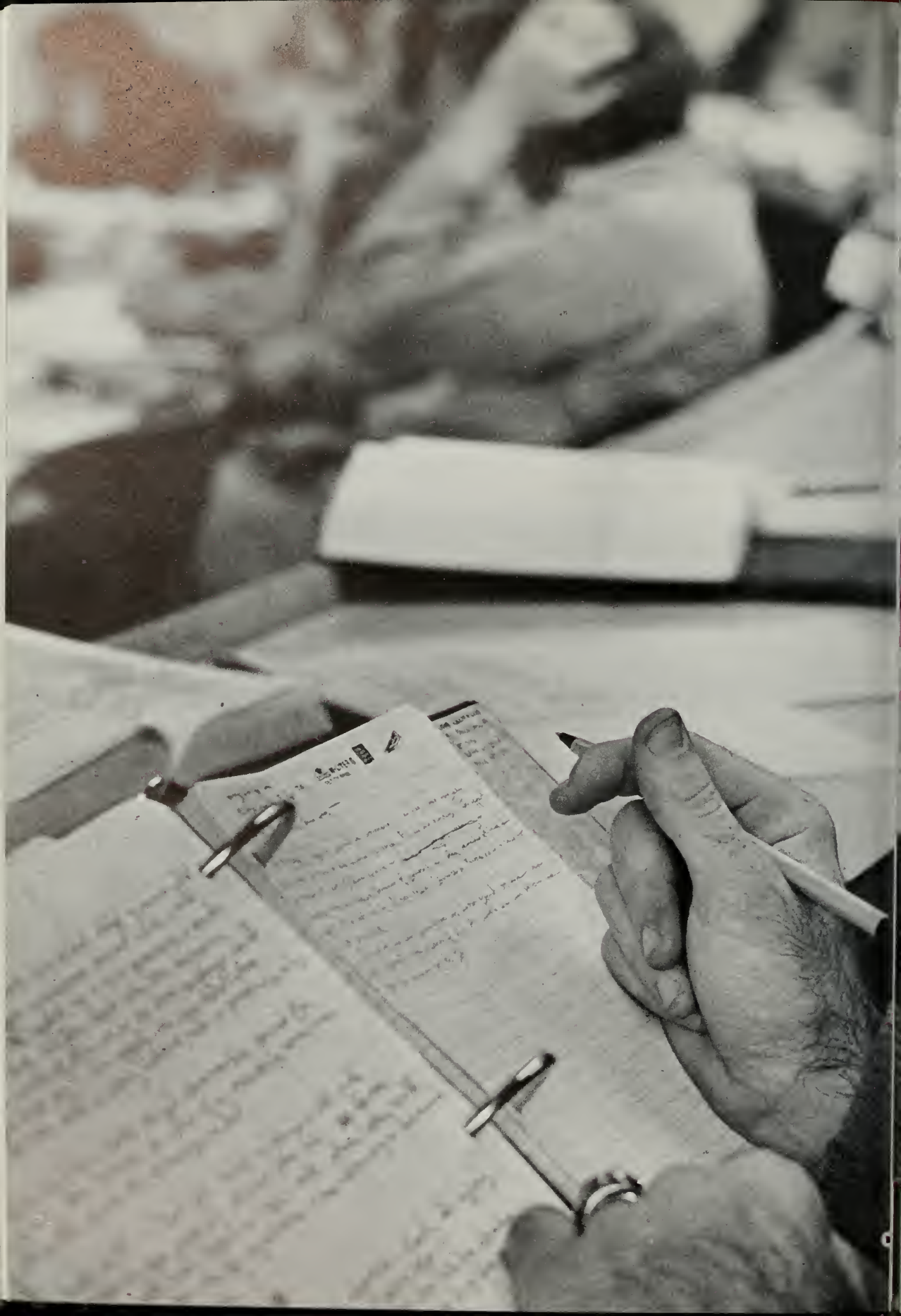
Law and Contemporary Problems. The School of Law publishes a quarterly, *Law and Contemporary Problems* edited by Assistant Professor John C. Weistart. This distinguished periodical, now in its thirty-fourth volume, presents in each issue a symposium in which writers of special competence from a number of disciplines discuss a particular problem of current importance. Editorial assistantships are available to second and third year students not writing for the *Duke Law Journal*. Individuals are selected for these positions on the basis of achievement and receive stipends for their work.

Duke Law Journal. American legal education boasts at least one unique institution. Only in America, and only in law, are the scholarly professional journals edited and largely written by students. The *Duke Law Journal* carries forward this proud tradition, which dates from the latter part of the nineteenth century. Articles written by teachers, lawyers, judges, and other scholars are critically evaluated and edited by the board of student editors. Notes and comments concerning recent judicial, legislative, and other developments are written by the students themselves and edited by their fellow students. The *Law Journal*, with six issues annually, has had a profound influence on the growth and development of the law.

Membership on the *Journal* is among the highest honors that can be attained by a student. Moreover, in the opinion of many, the experience gained in this work provides the best training that the Law School has to offer. It should be the aim of every qualified student to take advantage of this opportunity. Every student can seek membership by participating in the *Duke Law Journal's* Contributor Program.

Corporate Practice Commentator. The *Corporate Practice Commentator*, a quarterly periodical devoted to significant developments and innovations in the field of corporation law and practice, published by a commercial concern, is edited by Professor F. Hodge O'Neal at Duke. The *Commentator* gives attention to matters of interest and importance to counselors and managers of corporate and other business enterprises, with articles on corporation law and practice, antitrust questions, labor matters, patents and copyrights, executives' compensation, fair trade legislation, and other matters arising from business activities.





2

Program Information

Juris Doctor Degree

Upon favorable recommendation of the faculty, the degree of Juris Doctor (J.D.) will be conferred upon students who have successfully completed six semesters of law study. Two semesters of law study undertaken at another accredited American law school may be counted toward the required total as long as the final two semesters (exclusive of a summer session) and a minimum of 54 semester hours of law study are undertaken at Duke.

A student shall be deemed to have successfully completed six semesters of law study if during a minimum of 90 academic weeks he has completed the following requirements:

1. A passing grade in courses aggregating 84 semester hours;
2. A grade not requiring repetition thereof in every required course; and
3. A quality point average of at least 1.80 on a 4.0 scale.

Bachelor of Law Degree

Upon favorable recommendation of the faculty, the degree of Bachelor of Law (LL.B.) will be conferred upon students who shall have successfully completed all of the requirements listed above as necessary for the Juris Doctor degree but who do not possess a baccalaureate degree prior to completion of the program of study for the Juris Doctor degree.

Joint Degrees

Combined Medical-Law Degree (M.D.-J.D.). The School of Medicine and the School of Law of Duke University have jointly established a unique program of combined medical and legal education. The aim of the program is to provide a small number of selected individuals with the opportunity to acquire an edu-

cation in both medicine and law during a six-year course of closely integrated study in the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.D. and the J.D. degrees.

The student in the M.D.-J.D. Program begins his six year course of study in the School of Medicine. As in the regular M.D. program, his first year is devoted to the basic medical sciences and the second year to the basic clinical disciplines. At this point the student enters the School of Law, where his first year curriculum is the same as that of other law students. During the next two years he selects courses in the Law School which are of special application to his medical-legal interest, and his sixth and final year is spent in elective clinical work in the medical school, which may also be tailored to his specialized needs. In addition, the student will be required to complete additional elective basic science work amounting to 18 semester hours, or two summer sessions. His other summers will be unscheduled, but opportunities will be presented to enable the student to engage in medical-legal endeavors suited to his developing interests.

Throughout the six year program the student will have available to him the counsel of faculty members of the two schools to help him in the selection of courses and in the definition of his career objectives.

Applicants for the M.D.-J.D. Program must qualify for admission to both the School of Medicine and the School of Law. In addition, they must apply specifically for admission to the M.D.-J.D. Program. Applications will be passed upon by the Joint Law-Medicine Committee, which is composed of faculty members from the two schools. Personal interviews will be required of all applicants.

Because of the special intellectual demands involved in mastering two professions, high standards will be applied in admitting students to the program. The student will also be evaluated on the basis of motivation and demonstrated interest and likely achievement in the fields relevant to the program's concerns.

In view of the highly specialized character of the field, it is anticipated that enrollment in the program will be limited. Probably no more than three will be accepted in any one year.

Combined Master of Business Administration-Law Degree (M.B.A.-J.D.).

The School of Law and the Graduate School of Business Administration of Duke University have approved preliminary plans for establishing a program of combined legal and graduate business administration studies. The aim of the program is to provide a small number of selected individuals with the opportunity to acquire an education in both law and graduate business administration in a four year course of closely integrated study in the two fields. Upon satisfactory completion of the required course of study, candidates will be awarded both the M.B.A. and the J.D. degrees.

The student in the M.B.A.-J.D. Program will begin his first year course of study in either the Graduate School of Business or the School of Law. If the student begins in the Law School his first year curriculum will be the same as that of other law students; if he begins in the Graduate School of Business Administration, his first year curriculum will be the same as that of other graduate business students. The student's second year will consist of taking the full first year program of the other school. For example, if a student begins in the Law School, his second year will consist of the first year curriculum in the Graduate School of Business Administration. It is further anticipated that in the third and fourth



years of the program the student would take a mix of courses in the two schools. Throughout the four year program, the student will have available to him the counsel of faculty members of the two schools to help him in the selection of courses and the definition of his career objectives.

Applicants for the M.B.A.-J.D. Program must qualify for admission to both the Graduate School of Business Administration and the School of Law. In addition, they must apply specifically for admission to the M.B.A.-J.D. Program. Personal interviews are recommended for all applicants. It is anticipated that enrollment in the program will be limited.

Graduate Study in Law

The Law Faculty has the power to recommend that the University confer three separate graduate degrees: the degree of Master of Laws (LL.M.), the degree of Master of Comparative Law (M.C.L.), and the degree of Doctor of Juridical Science (S.J.D.). The number of candidates accepted for study in any of these degree programs is extremely limited. No systematic or formal program of graduate instruction exists at Duke Law School. Only in an exceptional case where a faculty member indicates willingness to supervise the work of a student, where the student does not require financial assistance, and where the student has achieved a superior academic record in his undergraduate law studies will an application be accepted. In such a case the course load, the program of instruction, and all other requirements for the degree will be determined by the Dean and the involved faculty member, subject to the approval of the faculty. Any candidate interested in obtaining one of the three graduate degrees of law at Duke should have formulated a specific project of research or interest prior to applying to the School.





3

Admissions, Finances, and Registration and Regulations

Admission

Juris Doctor Degree. First year students may enter only at the opening of the fall semester in any year. Students who have completed the first year of law study at this or any other law school approved by the Association of American Law Schools may enter at the beginning of any semester.

An application for admission to Duke Law School as a candidate for the degree of Juris Doctor may be submitted by any person who is a graduate of a college of approved standing. Applicants will be considered without regard to race, creed, religion, sex, or national origin. Applications may be submitted by a candidate without a prior baccalaureate degree if he has completed in a college of approved standing work equivalent in number of units to three-fourths of that required for graduation and whose college work in its entirety shows an average grade far above that required for graduation. The requirement in each case is determined by the regulations of the college where the work was taken. Graduates who have been admitted under this latter provision will be awarded the degree of Bachelor of Laws (LL.B.).

Combined Course Program. A number of colleges have permitted those who have completed three years of undergraduate work to enter the Duke Law School and upon the satisfactory completion of the first year of law school work receive their Bachelor of Arts degree from such colleges. It is suggested that students desiring to enter Duke Law School under such a program make inquiries of their proper college authorities. A student from an undergraduate college of Duke University who has completed therein three years of study may apply to that college to enroll in a combined course wherein his first year of law study may be accepted toward the Bachelor of Arts degree.

After receiving the Bachelor of Arts degree and completing four additional semesters of law study, a student in the combined course program will receive the degree of Juris Doctor. Less than 5 percent of an entering class is admitted on this basis.

Students considering entrance before obtaining the bachelor's degree should consult the rules of the Board of Bar Examiners in the state where they plan to practice law, for regulations applicable to this program.

For additional information, see the current *Prelaw Handbook*, published annually in October and prepared by the Law School Admission Test Council and the Association of American Law Schools. This book includes material on the law and lawyers, prelaw preparation, applying to law schools, and the study of law, together with individualized information on most American law schools. Each year the Duke Law School will furnish an up-to-date profile of the credentials of its last entering class for publication in the *Prelaw Handbook*. It may be obtained at college bookstores or ordered from Educational Testing Service, Box 944, Princeton, New Jersey 08540.

Advanced Standing. Any person who has complied with the requirements for admission set forth in this *Bulletin* prior to the commencement of his law study, who presents evidence of the satisfactory completion of one year of study at any law school which is a member of the Association of American Law Schools, and who is eligible for readmission to the law school from which he proposes to transfer, may apply for admission to advanced standing, subject to such rules as would be applicable to students in this School having a comparable scholastic record. Provisional credit for courses so completed will be given, with final credit contingent upon the completion of at least two academic years of law study at Duke Law School with satisfactory grades. Adjustment of credit for work done in other law schools may be made by the Dean or by vote of the faculty.

Admission to Joint Degree Programs. Any person interested in applying for admission to the M.D.-J.D. program must meet both the admission requirements



of the Duke University School of Law as a candidate for the J.D. degree and the admission requirements of the Duke University School of Medicine as a candidate for the M.D. degree. An applicant for the M.D.-J.D. degree should apply to both the Law School and the Medical School and must be accepted by both schools before he can apply for candidacy for this combined degree. For information on Medical School admissions the prospective applicant should write Admissions Office, Duke Medical School, 111 Davison, P. O. Box 2901, Durham, North Carolina 27706.

Admission Procedures. Application must be made on the prescribed Law School forms which are available upon request. A fee of \$20 is charged for processing an application and a check or money order for this amount should accompany the application. No application will be reviewed by the Admissions Committee and no applicant will be accepted until all required documents are on file. These documents are:

1. The application itself, to which a recent personal photograph must be attached.
2. Transcripts of all college and graduate academic records submitted through the Law School Data Assembly Service (LSDAS), Educational Testing Service, Box 944, Princeton, New Jersey 08540.
3. A report of the applicant's score on the Law School Admission Test (LSAT) administered by the Educational Testing Service. The LSAT is given periodically at examination centers conveniently located throughout the United States and at special foreign centers. The test administration dates in July, October, and December of the applicant's final year of undergraduate study are strongly preferred. No special preparation for the test is suggested, since it is designed to measure aptitudes, abilities, and general background rather than knowledge of subject matter. The applicant's score on the test will be considered along with other data in passing upon his admission to the Law School. Application forms and information should be procured by writing directly to: Law School Admission Test, Educational Testing Service, Box 944, Princeton, New Jersey 08540.
4. Two completed reference forms, one of which should be completed by an appropriate academic dean at the undergraduate school last attended. References should be requested to return their forms directly to the Admissions Office, Duke University, School of Law, Durham, North Carolina 27706. It is recommended that applications be filed no later than January 1 of the year for which admission is desired, and that the admission file be completed prior to February 1 of that year. Applications filed in the fall and completed prior to February 1 will receive decisions prior to March 15. The Law School does not ordinarily wait for the completion of the current year's college work before admitting an applicant; normally it takes action on the basis of a transcript showing college work through the junior year, although, at times, it may request a supplementary transcript also showing one term of the senior year. Such acceptance is subject to final action taken in the light of further supplemental transcripts showing all the college work required for admission to the Law School. (However, it would be extremely rare for an accepted applicant to be rejected later on the basis of his completed transcript.) Personal interviews are not required; however, a visit to the Law School might be informative to the applicant and an interview can be arranged if requested by the applicant.

Pass-Fail Transcripts. The Admissions Committee has had occasion in recent years to consider transcripts consisting of predominantly pass-fail grades. Only a minute percentage of those considered were admitted; and, it is fair to say that if there is a significant number of such grades, a student's chances of admission are inversely proportional to the percentage of such grades appearing on his or her transcript.

Financial Information

Fees and Expenses. The cost of providing a legal education of the quality offered by the Duke Law School is high and has been steadily increasing. Tuition provides only a part of the funds necessary, with the remainder provided by income from endowment, grants, and from gifts support of alumni and friends.

Tuition. Tuition at Duke is due and payable not later than the day of registration for a particular semester. For the academic year 1972-73, tuition will be \$1,175.00 a semester (\$2,350.00 for both semesters). After the final day of registration no refund in tuition will be made except for involuntary withdrawal to enter military service. Tuition for students enrolled in less than a full-course program will be determined from the following table:

Program	Number of hours	Amount per semester
1/5	1-3	\$ 235.00
2/5	4-5	470.00
3/5	6-7	705.00
4/5	8-9	940.00
Full	10 or more	1,175.00

Reduced tuition rates are relevant to (1) members of the faculties of neighboring public schools and colleges currently engaged in full-time school work while taking courses and (2) ministers of neighboring churches and full-time employees of Duke University who have been employed for one or more years and have written approval of their department head and the Budget Office will be as follows:

Program	Number of hours	Amount per semester
1/5	1-3	105.00
2/5	4-5	210.00
3/5	6-7	315.00

General Expenses. Students should be aware that the following estimates were compiled in the spring, 1972, and appropriate alteration of these estimates should be made to reflect any inflationary increases that may have occurred in the general economy since that date. It should also be recognized that the expenses of a Duke law student may vary considerably according to the style of living he assumes and such variables as distance of travel and whether he has a family. However, present expense levels for tuition, lodging, board, books (\$150 to \$200 if purchased new), supplies, transportation, and personal effects should fall within the following ranges: \$3,800 to \$4,400 for single students; \$5,000 to \$6,000 for married students; and \$5,700 to \$6,800 if married with one child.

Housing. The Graduate Center is available to men and women enrolled in the Law School. Most rooms are equipped for two persons and the rental charge for a double room is \$340.00 for the academic year for each occupant (\$170.00

per semester for each occupant). The charge for single room occupancy is \$500.00 for the academic year (\$250.00 per semester).

Men and women may also reside in the Town House Apartments which are complete with basic furnishings, utilities, and maintenance. Three persons occupy each apartment. The rental charge for the academic year is \$626.00 for each occupant (\$313.00 per semester). This, however, is subject to change.

Detailed information about University housing facilities for single and married students, including rental rates, will be provided upon request by the Director of Housing Management, Duke University, Duke Station, Durham, N. C. 27706.

Room Deposit. A \$50.00 deposit is required of each applicant before a residence hall room reservation is made. The initial room deposit is effective during the student's residence in the University residence halls if attendance is continuous in regular academic years.

Refund. The deposit will be refunded under the following conditions:

1. Within thirty days after the student has been graduated provided written notice is received at the Office of Housing Management requesting refund.

2. Upon withdrawal from Duke University residence halls by students enrolled on the semester basis, provided written notice is received by the Director of Housing Management by August 1 for cancellation of a reservation for the fall semester, and not later than January 15, for cancellation of a reservation for the spring semester.

3. When the reasons requiring withdrawal are beyond the student's control.

No refund will be made until the occupant has checked out of his room through the Housing Office and has settled his account with the Bursar.

Rooms are usually rented for the academic year, but are not rented for a period of less than one semester without special arrangements. After the day of registration, no refund of room rent will be made except for involuntary withdrawal to enter military service. Such refunds will be made in accordance with the University's established schedule. Regulations governing the occupancy of rooms will be supplied by the Director of Housing Management to those students who make application for housing.

Debts. No records are released and no student is considered by the faculty as a candidate for graduation until he has settled with the Bursar for all indebtedness.

Late Registration Fee. Students who register in any semester at a date later than that prescribed are required to pay to the Office of the Bursar a \$10.00 penalty for late registration.

Athletic Events Fee. Law students may secure admission to all regularly scheduled University athletic contests held on the University grounds during the entire academic year by payment of the athletic fee of \$25.00 per year plus any taxes that may be imposed. (This fee is payable in the fall semester.) They also may use the facilities of the Duke golf course upon payment of student green fees.

Duke Bar Association Fee. A \$5 fee (\$10 for both semesters) is due and payable not later than the day of registration for a particular semester; this fee is utilized exclusively to support the activities of the student bar association.

Scholarship Aid

The Law School recognizes that many students are unable to pay the full cost of their legal education and the University has established a number of University Scholarships to assist students who need financial aid. In addition, certain alumni and independent foundations have established endowed scholarships. Each year the Law School fully commits its scholarship resources, and continuous efforts are always underway to develop new sources for scholarship funds. Despite this, at present Duke Law School does not have the resources to provide scholarship assistance to all students who are in need. Most students who need financial aid are required to rely heavily on loan funds.

The scholarships that are available vary widely in amount. Except for a few scholarships that are based purely on merit, scholarships are awarded only to needy applicants with markedly superior college records and comparable Law School Admission Test scores. Most scholarships awarded by the Law School cover part or all of the tuition charge. In cases of exceptional merit and need, a few scholarships may consist of full tuition and a stipend. The more usual form of financial aid for the gifted applicant is a combination of scholarship and loan. Scholarship grants are renewable for second and third year students who maintain an outstanding level of academic achievement. A student seeking scholarship aid should file a scholarship application form at the same time as he files his application for admission, although it is entirely possible that decisions on scholarship grants will be made later than admissions decisions.

Beard-Rees Scholarship. This scholarship was established by their classmates and friends in 1968 to honor the memory of Robert L. Beard and David W. Rees of the Law Class of 1964. The fund is used to assist students of all-round character and potential as a tribute to the high personal standards, professional excellence, and accomplishments of these men.

B. S. Womble Scholarship. The B. S. Womble Scholarship has been established by a distinguished Duke alumnus, B. S. Womble, and members of his family. The scholarship is awarded on the basis of the moral character, scholastic ability, seriousness of purpose, and leadership potential of the applicant.

Elvin R. Latty Scholarship. Alumni and friends of the Law School established this fund in 1968 as a tribute to the wisdom, foresight, and dedication of Dean Emeritus Latty. In the few years since its inception, this fund has grown so rapidly that the first award was made in 1971.

John R. Parkinson Memorial Law Scholarship. This scholarship will be awarded at least biennially to a student whose pre-law achievements indicate a potential for academic excellence while in the Law School and a professional career in which outstanding service to clients and to the profession will be rendered.

Martha Garner Price Fellowship. This fellowship was created by a gift to the Rule of Law Research Center by the children of Ralph Price—the late Clay Price, Julian Price, and Louise (Mrs. Young Smith), in memory of their mother, Martha Garner Price. The purpose of the fellowship is to support advanced research in the field of international organization.

Scholarships for Disadvantaged Students. Duke University has established a limited number of scholarships for disadvantaged students which include full tuition and living expenses.

Loan Aid

Prospective law students who will need loan funds to help finance their education should apply immediately following their acceptance for admission; loan applications, unlike scholarship applications, should not be filed until a favorable admissions decision is received. In no event should they be filed later than July 1 prior to the beginning of the fall semester. Loans are available to Duke students under the student loan program established under the National Defense Education Act. Interest on these loans begins to accrue at 3 percent nine months after the student leaves the school, and repayment normally begins ten months after the student leaves the school, with complete repayment scheduled over a period of up to ten years.

Most states have now established guaranteed loan programs with similar terms for graduate and undergraduate study by their own residents. The Law School will supply information regarding any particular state and will make appropriate certifications in support of the loan application. Only if loan funds prove unavailable through the state guaranteed loan program should the student apply directly to Duke University for assistance under the National Defense Education Act.

Limited financial assistance in the form of loans from funds held in trust by the University are available to qualified law students. Interest on these loans, which mature after the student has left the school, accrues from the date of each note at the rate of 1 percent until the student has left the school and for five years thereafter at 3 percent per year, with repayment in installments over the five year period. Active efforts are also underway by the University administrators to develop greater loan reserves for Duke students. The Law School administration has also established a limited commercial loan program with the North Carolina National Bank for needy law students who do not qualify for federally insured loan assistance.

Approval of any loan application is based on the financial need, satisfactory scholastic standing, and personal integrity of the applicant. In addition to the loans mentioned above, the Law School participates in the United Student Aid Fund programs. These programs provide guaranteed commercial bank loans to needy law students. A special fund is also available to law students for small loans to meet temporary financial emergencies arising during the course of the year.

Deferred Tuition Program. In 1971, Duke University adopted a new "deferred tuition plan" to provide another alternative source of financial aid to needy applicants. At this time, the Law School has a limited amount of funding available for deferred tuition "loans." The unique feature of a deferred tuition "loan" is that the obligation to repay later is related to future income and is not defined in terms of a fixed dollar amount. Further information concerning the new deferred tuition can be obtained from the Dean's Office. As is the case with other Duke Administrative loans, deferred tuition applications should be filed after a student has received a favorable admission decision, but in no event later than the July 1 prior to the beginning of the fall semester.

Registration and Regulations

Registration. All students are required to register on the dates prescribed in the Law School Calendar at which time class schedules and course cards must be completed and approved. A student's registration for any semester is not complete until he has settled all indebtedness with the Office of the Bursar.

A student may alter his registration by enrolling in or withdrawing from a course during the first week of a semester. With the approval of the professor concerned and the Dean or Associate Dean, a student may substitute or change courses at any time prior to the end of the eighth calendar week following the commencement of classes. No alteration of enrollment may be made after the eighth week of classes. A moderate charge will be made by the University Registrar for dropping or adding any course.

Registration for Bar Examination. Many states now require that a student, prior to or shortly after beginning the study of law, register with the board of bar examiners of the state in which he plans to practice. This should be accomplished within 45 days after registration for the first semester's work at the Law School.

Academic Regulations and Course Requirements. No regular student is permitted to take less than 12 course hours per semester. No first year student may take courses in excess of the first year program. Second and third year students are not permitted to take for credit more than 16 course hours per semester, nor may they audit and take for credit more than 17 course hours per semester.

In exceptional cases, with the consent of the Dean, a student may take more or less than the prescribed maximum or minimum loads, but no student shall receive full residence credit if he takes fewer than the ten hours per semester for credit required for approved schools by the American Bar Association.

Scholastic Standards. The grading system currently in effect requires a written examination at the conclusion of each course with the exception of seminars and certain other forms of small-group instruction. Generally first year courses, with the exception of Criminal Law, will have only one examination, which shall be given in May. However, at the discretion of the instructor, an additional examination for credit may be scheduled during the year. (A practice mid-term is often given to first year students to aid them in evaluating their progress.)

Examinations are anonymously graded and are administered under the honor system. A faculty member has the authority to bar a student from the examination in his course for excessive absences or gross unpreparedness.

Courses grades are awarded by utilizing one of five adjectives: Honors, High Pass, Pass, Low Pass, Fail. For internal purposes only (i.e., election to Order of the Coif, certain prizes, Law Journal selection), and eligibility to continue law study, these five adjectives are converted to the 4.0 scale. Information on rank in class is not released to prospective employers nor to individual students. Students are of course free to release their cumulative grade averages as well as their individual course grades to prospective employers. If a student does choose to release such information, the prospective employer may verify the accuracy of such released information with the Dean's Office.

While grade distribution will vary from course to course, the normal distri-

bution in an average class with a large (over 40 students) enrollment will approximate the following: Honors, 10-15%; High Pass, 35-40%; Pass, 40-50%; and Low Pass and Fail, 0-10%.

Credit/Fail Option. Any student may in his third, fourth, fifth, or sixth semester select any one course to be taken on a credit/fail basis. Under this option, course work which would receive a grade of *Pass* or better under the normal grading system will receive a grade of *Credit*. Work which would normally receive a grade of Low Pass will receive a grade of *no credit* and a grade of *fail* is treated just as it is under the normal grading system. Grades of *credit* will not be considered in computing a student's overall average except for the purpose of determining whether a student is eligible to continue the study of law or to graduate, in which case the grade will be equated with a 2.0. Grades of *no credit* will not be considered in computing a student's average, but grades of *fail* will be so considered.

A student in his second and third years may select one otherwise-graded course each semester to be graded on a credit/fail basis subject to the limitation that no student may amass more than 15 hours of ungraded credit during his academic career at Duke. Summer school hours and hours attributable to courses taken in other divisions of the University are to be included in this total. Courses in the Law School which are, by faculty action to be graded on a credit/fail system only, do not count for this total. The 15 hour limitation notwithstanding, members of the present class of 1973 may take ungraded course credits to a maximum of 8 semester hours in their third year.

Credit/No Credit Grading. Credit will be given for courses taken in other divisions of Duke University if the student receives a *C* or *S* or better grade. Contrary to the credit/fail system outlined above, a grade of less than *C* or *S* will merely result in no credit being awarded for courses taken under these provisions.

Eligibility to Continue Law Study. Any student with an overall grade point average of 1.80 or higher shall be considered to be in good standing and entitled to continue the study of law. Any student with an overall grade point average less than 1.80 but not less than 1.50 shall be considered to be in a probationary status and may be declared ineligible to continue the study of law in the discretion of the Dean. Furthermore, any student who in any single semester or in any single year receives failure grades in courses totaling eight or more semester hours may at any time be declared ineligible to continue by the Dean. Any student with an overall grade point average of less than 1.50 shall be ineligible to continue the study of law.

Notification of Un satisfactory Scholastic Standing. Any student subject to the provisions of the second and third sentences of the paragraph above who has not been declared ineligible to continue his work in the School will be given a formal, written notice by the Dean's office. This notice will set forth his average grade or grades and inform him that he will be subject for the ensuing year to the special supervision of the Dean, who may order his dismissal from the School in the event of his failure to maintain a satisfactory scholastic standard, and that he will be ineligible to receive a degree unless his work meets the scholastic requirements for graduation, which will be set forth in full in such notice.

Every other student whose average final grade at the end of any semester on

the work of that semester, or on all work then taken, does not exceed the minimum average grade required for graduation will be given a notice similar to that provided for above.

Rules Concerning Examinations and the Submission of Research Papers.

No student may enroll in any course in which he has previously submitted a research paper or has taken the final examination except a student who failed the course and is required by the instructor to retake it, or who obtains the permission of the faculty to do so. The grade received in the second enrollment in the course shall be substituted for the first grade received, except that the highest grade for which a student shall be eligible on a retaking of a course shall be a grade of Pass.

No student may, without the permission of the faculty, withdraw from any course in which he is enrolled after the eighth calendar week of the course, unless the student also withdraws from the Law School.

Except with the permission of the faculty, no credit shall be given a student for any research paper submitted in partial or full completion of the requirements of a course in which he is enrolled unless such paper is submitted on or before the last day of the examination period or on such earlier date as the professor may require.

Except with the joint permission of the Dean of the Law School and the faculty member involved, no student shall receive any credit for any examination taken in partial or full completion of the requirements of a course in which he is enrolled unless that examination is taken during the time it is regularly scheduled. Such permission shall be granted only in the case of sickness, extreme personal hardship or a conflict in the scheduling of two or more examinations in courses in which the student is enrolled.

Regulations Governing Withdrawal for Military Reasons. A student in good standing enrolled in a one-semester course who withdraws from the Law School in order to enter military service after the end of the eleventh week of the semester (measured from the first day of class) will be eligible to submit a paper in a seminar or undertake a special examination in a course on a credit/fail basis. Credit will be awarded for the course if a passing grade is received on the paper or examination.

A student in good standing enrolled in a one-year, two-semester course who withdraws from the Law School in order to enter military service after the end of the eleventh week of the second semester will be eligible to undertake a special examination on a credit/fail basis. Credit for the entire course will be awarded if a passing grade is received.

A student in good standing who is required to withdraw from the Law School to enter military service before the time periods set forth in the preceding paragraphs may nevertheless be permitted to take a special examination on a credit/fail basis in a course or submit a paper in a seminar at the discretion of his professor in unusual circumstances where, in the opinion of the professor, the performance of the student justifies such action.

The Honor System. The honor system of Duke Law School demands of each student the highest standards of academic and professional conduct, subject

to the judicial code promulgated by the students and approved by the faculty. The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Nonacademic Regulations: Motor Vehicles. Each motor vehicle operated on the campuses by students enrolled in the School of Law must be registered at the Traffic Office within five days after arrival, and thereafter must bear the proper registration emblem. The Security Department publishes detailed regulations which govern the operation of all motor vehicles on the campus. A copy of these regulations will be available when motor vehicles are registered. All students are expected to adhere to them.

Policy Concerning Pickets, Protests, and Demonstrations. Duke University respects the right of all members of the academic community to explore and to discuss questions which interest them, to express opinions publicly and privately, and to join together to demonstrate their concern by orderly means. It is the policy of the University to protect the right of voluntary assembly, to make its facilities available for peaceful assembly, to welcome guest speakers, and to protect the exercise of these rights from disruption or interference.

The University also respects the right of each member of the academic community to be free from coercion and harassment. It recognizes that academic freedom is no less dependent on ordered liberty than any other freedom, and it understands that the harassment of others is especially reprehensible in a community of scholars. The substitution of noise for speech and force for reason is a rejection and not an application of academic freedom. A determination to discourage conduct which is disruptive and disorderly does not threaten academic freedom; it is, rather a necessary condition of its very existence. Therefore, Duke University will not allow disruptive or disorderly conduct on its premises to interrupt its proper operation. Persons engaging in disruptive action or disorderly conduct shall be subject to disciplinary action, including expulsion or separation, and also to charges of violations of law. The foregoing is a general statement of policy and is not to be construed as limiting the University's right to maintain an atmosphere conducive to scholarship.





4

Curriculum

Degree Program

The curriculum at Duke Law School is not fixed and static. All courses are subject to constant evaluation and the organization of the curriculum itself is subject to critical examination each year by the faculty. As the frontiers of the law move, as new faculty members are added, and as new intellectual interests develop among students and faculty, one can expect to see evolution in the curriculum. The curriculum organization for the academic year 1972-1973 is set forth below.

First Year Courses

The first year curriculum is required for all J.D. candidates.

<i>Courses</i>	<i>Fall</i>		<i>Spring</i>
Civil Procedure	3	and	3
Constitutional Law	3	and	2
Contracts	3	and	2
Criminal Law	2		
Criminal Procedure			3
Property	2	and	2
Torts	2	and	3
	<hr/>		<hr/>
	15		15

Two sections of Civil Procedure, Contracts, Criminal Law, Criminal Procedure, Property, and Torts will be taught. The first year class will be divided unevenly for assignment to two sections of each course. One section of each first year course will be small, with less than 30 students. The other section of that course will contain the balance of the first year class. Each first year student will be guaranteed one small-section class for the full academic year and yet will study



with the balance of his class for all other courses in the large sections of those other courses. For example, if a student is assigned to the small section in Torts he will automatically be assigned to the large section of his other first year courses. This system enables each student to study with all of his first year classmates and also receive the advantage of small course instruction even in the first year. Research and writing assignments will be given in conjunction with the small sections of each course. In addition, an optional series of lectures and assignments in research and writing techniques will be conducted in the fall semester.

110. Civil Procedure. This course is devoted to a consideration of the basic problems of civil procedure. It is designed to acquaint students with the fundamental stages and techniques of litigation—e.g., pleading, discovery, trial, appeal, judgments, and multiparty actions—and to introduce them to underlying problems such as jurisdiction, choice of law in a federal system, and the role of courts as law-making institutions. 3 s.h. fall; 3 s.h. spring. *Paschal and Dellinger*

120. Constitutional Law. The distribution of and limitations upon governmental authority under the Constitution of the United States. Included are study of the doctrine of judicial review of legislative and executive action; the powers of Congress and the President; the limitations on state governmental powers resulting from the existence or exercise of congressional power; and judicial protection against the exercise of governmental power in violation of rights, liberties, privileges, or immunities conferred by the Constitution. 3 s.h. fall; 2 s.h. spring. *Dellinger*

130. Contracts. The formation and legal operation of contracts, their assignment, significance to third parties, and relationship to torts, restitution, and

commercial law developments; the variety, scope, and limitations on remedies; and the policies, jurisprudence, and historical development of promissory liability. 2 s.h. fall; 2 s.h. spring. *Harvey and Weistart*

140. Criminal Law. An introductory study of the law of crimes and the administration of criminal justice; analysis of the criminal act and the mental element in crime; consideration of specific offenses as defined by statute and the common law; discussion of typical defenses in relation to specific crimes. 2 s.h. fall. *Livengood and Shimm*

150. Criminal Procedure. A study of the basic elements of criminal procedure, with special emphasis upon constitutional requirements, including arrest, "stop and frisk," search and seizure, interrogation, electronic surveillance, the preliminary hearing, bail, criminal discovery, plea bargaining, and prosecutorial discretion. 3 s.h. spring. *Everett and Pye*

160. Property. The basic concepts of real property law and conveyancing. Historical background; estates in land, including the fee simple, the fee tail with its statutory substitutes, the life estate, the estate for years and other nonfreeholds; concurrent ownership; types of future interests; conveyances before and after the Statutes of Uses, landlord and tenant; the modern deed-kinds, delivery, description, title covenants; covenants and agreements running with the land at law and in equity; easements; recording and title registration. 2 s.h. fall; 2 s.h. spring. *Sparks and Reppy*

170. Torts. An analysis of liability for personal injuries and injuries to property. After considering "cause in fact," intentionally inflicted harm and the development from trespass to negligence, the course concentrates mainly on the negligence issue. The reasonable man standard, and its application and proof before courts and jury are explored. Limitations such as contributory negligence, lack of duty, and proximate cause are considered as are special rules governing owners and occupiers of land. The question of damages is analysed; the course also examines strict liability, the liability of producers and sellers of products, insurance, and workmen's compensation. 2 s.h. fall; 3 s.h. spring. *Christie and Rutledge*

Second and Third Years

In the absence of special authorization from the Dean, each student is required to take in each semester courses aggregating not less than 12 and not more than 16 hours.

The program in the second and third years is entirely elective. In planning his elective program, the student must bear in mind that certain courses are prerequisites to other advanced courses:

Business Associations is prerequisite to Business Planning, Securities Regulation, and the Seminar in Corporate Planning and Drafting.

Evidence is prerequisite to trial practice courses.

Estate and Gift Taxation and Trusts and Estates I and II are prerequisite to the Seminar in Estate Planning.

Labor Relations I is a prerequisite for Labor Relations II.

Labor Relations I and II are prerequisites to the Seminars in Labor Law and Internal Union Affairs.

Personal Income Taxation is a prerequisite to Corporate Taxation, Estate and Gift Taxation, Taxation of Foreign Income, and the Seminar in Taxation.

Trusts and Estates I is a prerequisite for Trusts and Estates II.

The student should also bear in mind that, although the program in the second and third years is entirely elective, for logical course progression and in order to avoid conflicts in the class schedule, it would be advisable for certain basic electives to be taken in the second year and certain other electives in the third year.

Clinical Education. In its continuing effort to provide the very best possible legal education, Duke Law School is developing a clinical legal education program which will be of optimum benefit to the student consistent with prudent management of resources. At the present time, substantial experience of the clinical type is available through the following courses and seminars. Descriptions of these may be found on pages 30-39.

Business Planning	Seminar in Law and Politics
Civil Trial Practice	Seminar in Legal Problems of a
Civil and Criminal Trial Practice	University
Modern Real Estate Financing	Seminar in Negotiation
Seminar in Corporate Planning and	Seminar in Psychiatry and Law
Drafting	Seminar in Sentencing and Corrections
Seminar in Estate Planning	

Second Year—Recommended Courses

<i>Courses</i>	<i>Fall</i>		<i>Spring</i>
Administrative Law	3	or	3
Antitrust	4		
Business Associations*	4	or	4
Commercial Law	4		
Consumer Protection	3		
Environmental Law	2		
Evidence*	3	or	3
International Law	3		
Jurisprudence			3
Labor Relations I*	2	or	2
Labor Relations II*			2
Law & the Arts	3		
Law & Developing Societies			3
Legal Accounting			2
Personal Income Taxation*	3		
Personal Income, Estate & Gift Taxation*	2	and	2
Personal Torts	2		
Trusts & Estates I*	4		
Trusts & Estates II*	2	or	2

*For those intending to take advanced courses and seminars in area.

Third Year—Recommended Courses

<i>Courses</i>	<i>Fall</i>		<i>Spring</i>
Admiralty	3		
Business Planning	4		
Civil Trial Practice			2
Civil & Criminal Trial Practice	3	or	3
Community Property	2		
Comparative Law			3
Conflict of Law		(3)	
Corporate Finance			2
Corporate Taxation			3
Debtor's Estate	3		
Equitable Remedies	3		
Estate & Gift Taxation*	2		
Family Law			3
Federal Courts			3
Foreign Income Taxation			2
Labor Standards			2
Land Use Planning	2		
Law & Economics			3
Legal Profession			1
Modern Real Estate Financing			3
Regulated Industries			3
Securities Regulation			3
Urban Problems	2		
Workmen's Compensation			2

Alternate Years

1972-1973

Patents, Trade Marks & Trade Secrets

1973-1974

Legal History

Seminars

Civil Liberties & Rights (not offered 1972-1973)		(3)	
Commonwealth Studies—Interdisciplinary			2
Communications			2
Corporate Planning & Drafting	2	or	2
Criminal Law			2
Criminal Procedure	2		
Decision Making Under Scientific Uncertainty (not offered 1972-1973)		(2)	
Estate Planning	2	or	2
International Organizations			2
Law & Politics			3
Legal Problems of a University			2
Labor Law	2		

*For those intending to take advanced courses and seminars in area.



Julie Nixon Eisenhower on a visit to the Law School in the fall of 1971.



Professor F. Hodge O'Neal talking with former Attorney General Ramsey Clark.

Medical, Legal, and Ethical Issues—Interdisciplinary		2
Medicine & Law (not offered 1972-1973)	(2)	
Military Law	2	
Negotiation	2	
Poverty and Law (not offered 1972-1973)	(2)	
Racial Discrimination	2	
Public Law of Foreign Trade		2
Sentencing (not offered 1972-1973)	(2)	
Tax Exempt Organizations	2	
World Law	2	

Alternate Years

1972-1973

Jurisprudence

1973-1974

Sex and the Law

In addition to the courses set forth above, the Law School encourages individual and small-group research and study for credit. Law students in their second and third years of the J.D. program may undertake up to 4 hours of independent research in any academic year if the research is approved by a faculty member. Research work will be graded on a credit/fail basis.

A group of five or more students may plan and conduct their own research and seminar program for not more than 2 semester hours of credit (which shall be considered to be independent research within the meaning of the maximum limitation of 4 hours of independent research each year). A request to establish such an *ad hoc* seminar should be addressed to the Dean at least two months before the beginning of the semester in which the seminar is proposed. The Dean will request a member of the faculty to evaluate the program and recommend whether the proposed program has academic merit. If approved by the Dean, a faculty member will be requested to evaluate the contribution of each participant before awarding credit. Such seminar work shall be graded on a credit/fail basis.

Second and third year students may also take courses offered in other divisions of the University upon the condition that the student is engaged simultaneously in at least 10 semester hours of courses in the Law School. Credit (limited to a total of 6 hours) toward the J.D. degree will be granted for those courses where, in the judgment of the Dean, the courses contribute to the student's education in the law or professional interests. A grade of *C* (or *S*) or better will be transferred to the Law School on a credit/no credit basis. No credit will be awarded for a grade lower than *C* (or *S*).

Elective Courses—1972-1973

200. Administrative Law. The formulation of statutory schemes of administrative regulations; the organization of administrative agencies; the determination, promulgation, and enforcement of administrative programs; the respective spheres of administrative and judicial responsibility; judicial control over administrative action. Practice and procedure before administrative agencies: informal conferences and negotiations; formal hearings; constitutional limitations. 3 s.h. fall; 3 s.h. spring. *Rutledge and Lange*

400. Admiralty. The special body of law governing maritime affairs, especially the transportation of goods and passengers by water. Admiralty jurisdiction; marine insurance; carriage of goods; charter parties; general average; rights of injured seaman and others; collision; salvage; maritime liens and ship mortgages; limitation of liability; governmental activity in shipping. 3 s.h. fall. *Paschal*

205. Antitrust. A study of the federal antitrust laws and their policies, especially the use of competition to control private economic behavior. 4 s.h. fall. *Bell*

210. Business Associations. (Mostly corporations, with brief comparison with general principles of agency, partnership, and other non-corporate forms. Emphasis is on the developing federal law of corporations on many of the following topics.) The process of incorporation, promoters and pre-incorporation transactions, distribution of powers within that corporation, workings of the proxy system, special features of the close corporation, duties, and liabilities of insiders, problems in

connection with the purchase or sale of any security, shareholders derivative suits and related rights. In addition: generalized treatment of financing of corporate enterprise, governmental regulation of distribution of public issues of securities, dividends and other distributions to shareholders, fundamental changes by recapitalization, merger and other combinations. (Specialized treatment of the above "in addition" topics is reserved for other courses and seminars, particularly Corporate Finance, Securities Regulation, and Business Planning.) 4 s.h. fall; 4 s.h. spring. *Latty and O'Neal*

300. Business Planning. This course involves advanced work in corporation and income tax law on a series of basic problems that commonly and currently face business lawyers in the formation and financing of corporations (both close and public), restructuring ownership interests and financing their withdrawal, share repurchases for insiders' strategy, sales and purchase of businesses, merger and other enterprise combination, enterprise division and dissolution. The problems are analyzed, and solutions are presented in class discussion and papers, by an integrated approach that embraces not only questions of corporate and tax law but also of accounting and sales of securities. 4 s.h. fall. *Latty*

385. Civil Trial Practice. A study of the advocate in the trial of civil law suits, with emphasis on methods of pre-trial preparation and development of facts in court, typical uses of rules of procedural and substantive law in trial proceedings, and tactical and ethical aspects of problems which confront the trial lawyer. The course is open only to students who have completed the course in Evidence. 2 s.h. spring. *Caffrey*

380. Civil and Criminal Trial Practice. While covering the same basic elements of practical training as does the course in Civil Trial Practice, this course extends slightly further so as to examine also the problems facing the advocate in a criminal proceeding. This course is open only to students who have completed the course in Evidence. 3 s.h. fall; 3 s.h. spring. *Read and Rutledge*

215. Commercial Law. This integrated study of the law governing commercial transactions emphasizes the application of the Uniform Commercial Code, particularly the articles dealing with sales, secured transactions, and commercial paper. A primary objective of the course is the development of an analytical basis for interpretation of this statute. The business judgments of commercial practice provide an interpretative framework. The structure of typical transactions is emphasized to suggest both the interrelation of the several articles of the Code and the relevance of other statutory and decisional law. Topics which are given particular emphasis include the enforceability of limitations on sales warranties, the optional nature of remedies for the breach of sales contracts, the function of common forms of commercial paper, the mechanics of the bank collection process, and the operation of retail systems. 4 s.h. fall. *Gillmor*

218. Community Property. The marital property law of Arizona, California, Idaho, Louisiana, Nevada, New Mexico, Texas and Washington. Emphasis on California to the extent the law differs. Primarily a casebook course. 2 s.h. fall. *Reppy*

305. Comparative Law. An examination and comparison of the law of

selected jurisdictions on certain specific topics. The history, sources, and methods of the civil law will be investigated, discussed, and compared with those of common law countries. 3 s.h. spring. *Grzybowski*

310. Conflict of Laws. A study of the special problems which arise when the significant facts of a case are connected with more than one jurisdiction. Recognition and effect of foreign judgments; choice of law; federal courts and conflict of laws; the United States Constitution and conflict of laws. 3 s.h. fall. *Reppy*

220. Consumer Protection. Trends in laws affecting retail buying and selling of goods and services. The course will focus on problems involving purchases of personal property, especially by the poor and uneducated, with some attention also given to purchases of realty and services. The area of product quality and liability will also be explored briefly. 3 s.h. fall. *Marshall*

315. Corporate Finance. Diverse characteristics of shares and creditor securities, consideration and payment of shares, rights and option in shares, capital and surplus and related accounting concepts, limitations on dividends and share repurchases, impact of federal regulation on promoter's role and public-issue financing, the pervasiveness of "10b-5," anatomy of merger, asset and stock acquisitions, alteration and combining of corporations. 2 s.h. spring. *Gillmor*

320. Corporate Taxation. An advanced course in corporate income taxation with substantial coverage of tax problems in the organization, reorganization, liquidation, and combining of corporations. 3 s.h. spring. *Hobbet*

325. Debtors' Estates. Comparative study of methods used for the liquidation and distribution of debtors' estates. The nonbankruptcy materials cover individual creditor's rights by attachment, garnishment, execution, creditors' bills, and the like; common law compositions and extensions; and general assignments. The bankruptcy materials cover, in the main, the first seven chapters of the Bankruptcy Act. 3 s.h. spring. *Shimm*

327. Environmental Law. A study of the legal and administrative schemes for protecting natural resources and curbing pollution. 2 s.h. fall. *Levine*

330. Estate and Gift Taxation. The principal emphasis of the course is on the federal estate and gift taxes. Consideration is also given, however, to the related portions of the federal income tax dealing with the taxation of the income of estates and trusts and income in respect of a decedent. 2 s.h. fall. *To be announced.*

332. Equitable Remedies. A survey of equitable remedies in general (including enforcement of equity decrees) and of important parts of the fields of equity and restitution that are not covered in other courses. 3 s.h. fall. *Harvey*

225. Evidence. A study of the theory and rules governing the presentation of evidence to a judicial tribunal including the function of the judge and jury; the limitations of the adversary system; the concept of relevancy; character evidence; judicial notice; real and demonstrative evidence; authentication of writings and the best evidence rule; competency, impeachment, and rehabilitation of witnesses; hearsay and the exceptions to its exclusion; privileged communications. 3 s.h. fall; 3 s.h. spring *Pye and Read*

335. Family Law. Developments in the relationship between the state and the family. The course will survey the spectrum of family relationships and activities regulated in some fashion by the state, including procedures for marrying, legal relationships within an on-going family and problems in the dissolution of the family. Special emphasis will be placed on agreements concerning the custody of children and property settlements on divorce. There will be some discussion of the family as seen by other behaviorial disciplines. 3 s.h. spring. *Marschall*

340. Federal Courts. A study of the federal courts with respect to the part played by them in achieving a workable federalism. Special attention will be given to the original jurisdiction of the federal district courts, the relationship of the federal courts to state courts and state law, and the permissible and desirable range of federal judicial power. 3 s.h. spring. *Paschal*

420. Foreign Income Taxation. A study of the United States income tax imposed on income from foreign sources and on income of foreign individuals and corporations. 2 s.h. spring. *Hobbet*

230. International Law. A survey of public international law of peace, as evidenced especially in decisions of national and of international courts; the drafting and interpretation of treaties; the nature of handling of international claims; the organization and jurisdiction of international tribunals, with special reference to the International Court of Justice; developments with respect to the codification of the law. 3 s.h. fall. *Grzybowski*

235. Jurisprudence. A historical examination of the development of legal philosophy from ancient times until the contemporary period. 3 s.h. spring. *Christie*

240, 245. Labor Relations I and Labor Relations II. A study of the law relating to collective bargaining and concerted labor activities, including the National Labor Relations Act and related legislation, the legal aspects of strikes, boycotts, and picketing, the negotiation and administration of collective bargaining agreements, procedures for the settlement of labor disputes, and relations between the union and individual employees. (Students may take one or both semesters except that Labor Relations I is a prerequisite to Labor Relations II.) Labor Relations I, 2 s.h. fall; 2 s.h. spring. Labor Relations II, 2 s.h. spring. *Livengood and Weistart*

350. Labor Standards. Government regulation of conditions of employment, including the Fair Labor Standards Act and other wage-hour and child-labor statutes, equal employment opportunity, unemployment insurance and other social security legislation, and related laws establishing minimum standards for the creation, continuance, and termination of the employment relationship. In addition to other objectives, the course will seek to develop skills in legislative advocacy and procedure, and in the drafting and interpretation of statutes. 2 s.h. spring. *Livengood*

355. Land Use Planning. A survey of legislative, administrative, and judicial controls utilized to facilitate the orderly development and redevelopment of real property. This consideration will include public and private nuisance, zoning, subdivision control, housing codes, street mapping, and condemnation. The clash

of individual and societal interests in land use is explored through cases involving the distinction between valid police power regulations and "takings" for public use which require payment of compensation. Problems of urban renewal, regional planning, and pollution of water and air will also receive consideration. 2 s.h. fall. *Everett*

357. Law and the Arts. An introduction to basic problems in entertainment law, the area of specialty practice involving the representation of publishers, broadcasters, CTV operators, film producers, artists, writers, musicians, and performers. The course includes detailed instruction in the law of copyright as well as unfair competition in artistic works, the protection of ideas, the right of publicity and performers' rights, and selected aspects of defamation and invasion of privacy. 3 s.h. fall. *Lange*

354. Law and Developing Societies. A study of fundamental legal principles and concepts as they are applied in developing societies. 3 s.h. spring. *Harvey*

359. Law and Economics. The course will cover the basic elements of microeconomics (how and why markets work) including welfare economics (when and why markets fail). Although the implication of the theory for policy in areas such as antitrust and government regulation of business, environmental control, housing, and welfare will be discussed, the primary emphasis will be on mastering the basic tools of analysis. Not opened to persons having the equivalent of an undergraduate economics major. 3 s.h. spring. *Bell*

250. Legal Accounting. An examination and analysis of accounting principles and practices necessary for understanding and investigating facts relevant to a variety of legal problems. The course is designed to familiarize students with the language of accounting, what it discloses and what it leaves unsaid, and how the work of accountants is used by government in regulation of business, by business managers in making decisions, by lawyers in solving legal problems, and by investors and lenders in managing and protecting their property. 2 s.h. spring. *Gillmor*

410. Legal History. A study of the development of fundamental English and American legal institutions. (Not offered in 1972-73.) 3 s.h. *Christie*

360. Legal Profession. A study of the function of lawyers; the organization of legal education and the profession; legal relations between lawyers and clients including fee arrangements and lawyers' liability for malpractice; standards of professional conduct; techniques for making legal services available to persons not now represented. 1 s.h. fall or spring. *Faculty*

365. Modern Real Estate Financing. An examination of techniques of real estate financing including conventional mortgages, subdivision development, and federal assistance to real estate developers. 2 s.h. fall. *Everett*

254. Patent Law. A short survey of the law relating to patents and trademarks, with some coverage of copyrights, primarily to give the general practitioner a foundation in these areas to collaborate effectively with specialists. Special attention is given to overlapping problems in above-mentioned areas. 2 s.h. fall.



257. Personal Income, Estate and Gift Taxation. A two-semester course combining the essentials of the courses in federal estate and gift taxation and personal federal income taxation. For more detail see descriptions of Estate and Gift Taxation and Personal Income Tax. 2 s.h. fall; 2 s.h. spring. *Sneed*

255. Personal Income Tax. An introduction to federal income taxation, with emphasis on the determination of taxable income of businesses, the character of the income realized, and the proper taxpayer on which to impose the tax. 3 s.h. fall. *Hobbet*

415. Personal Torts. A study of the law of defamation, privacy, and infliction of emotional distress from the point of view both of tort law and constitutional law. The availability of tort actions to redress violation of constitutional rights will also be examined. 2 s.h. fall. *Lange*

370. Regulated Industries. Government economic regulation in such regulated industries as transportation, broadcasting, and power, plus directed study of specific problems of trade regulation. 3 s.h. spring. *Levine*

375. Securities Regulation. A study of the federal and state securities laws and the industry they govern, with emphasis on the mechanics and regulation of the distribution process and trading in securities; subjects dealt with include the functions of the Securities and Exchange Commission, registration and disclosure

requirements and related civil liabilities, "blue sky" laws, proxy solicitation and reporting requirements, broker-dealer regulation, the self-regulatory functions of the exchanges, and the regulation of investment companies. 3 s.h. spring. *Stolz*

265, 270. Trusts and Estates I and Trusts and Estates II. Non-commercial property dispositions, both testamentary and inter vivos, including the following topics: the estate system, trusts, and powers of appointment as instruments for estate planning; intestate succession; execution and revocation of wills; creation of trusts; class gifts and construction; ademption and lapse; integration of dispositive schemes; charitable trusts; resulting trusts; remedies for wrongful interference with succession and transfer; problems in trust administration; rules against perpetuities, accumulations, and restraints on alienation. (Students may take one or both semesters except that Trusts and Estates I is a prerequisite to Trusts and Estates II. Contracts and Property I are both prerequisites to Trusts and Estates I.) Trusts and Estates I, 4 s.h. fall; 4 s.h. spring. Trusts and Estates II, 2 s.h. spring. *Sparks and Reppy*

390. Urban Problems. The institutional setting, role of states and of the federal government, annexation, scope of local government power, intergovernmental relations, legislation by local government, enforcement of regulatory measures, labor-management relations in public employment, financing local government, public expenditures, urban renewal, housing and code enforcement, eminent domain, governmental tort liability. 2 s.h. fall. *Everett*

547. Workmen's Compensation. This course covers the main elements of workmen's compensation law in the United States, together with questions of conflict of laws, third-party actions, and coordination with other social insurance programs. 2 s.h. spring. *Larson*

Seminars—1972-73

500. Seminar in Civil Liberties and Civil Rights. Studies in the field of personal liberties (freedom of speech, press, religion, association, etc.) and in the field of civil rights (right to non-discriminatory treatment, right to fairness in procedure, etc.). The seminar will be concerned with issues about which the law is unsettled, and especially with issues raised in cases pending before the Supreme Court of the United States. (Not offered in 1972-73). 3 s.h. *Van Alstyne*

401. Commonwealth Studies. An interdisciplinary study of various current problems arising out of the British Commonwealth system. The entry of Britain into the Common Market and its effect upon the Commonwealth will be treated. 2 s.h. spring.

503. Seminar in Communications. An in-depth study of government regulation of news media and other legal problems involving the publication and broadcasting industries. 2 s.h. spring. *Lange*

505. Seminar in Corporate Planning and Drafting. The student is given hypothetical corporate problems (perhaps taken from the practicing lawyer's desk) on a client's proposed course of action; each problem is designed to require the student to grasp the business situation and goals involved, analyze for pertinent

legal principles, plan the transaction to avoid legal business (including taxation) pitfalls, plan the requisite steps to consummate the desired transaction, draft the appropriate papers and present his research. 2 s.h. fall; 2 s.h. spring. *O'Neal and Stolz*

510. Seminar in Criminal Law. Current problems in administering criminal justice, including studies of theory and technique in criminal procedure (investigation, prosecution, and defense of criminal charges), inquiry into basic policy in the use of criminal sanctions for the promotion of public order, consideration of contemporary developments (legislative, judicial, and administrative) in substantive and adjective criminal law, and analysis of specific problem areas such as mental responsibility, sexual deviation, attempts, and vicarious liability. 2 s.h. spring. *Livengood*

560. Seminar in Criminal Procedure. Investigation of crime and the police practices, pertinent thereto, including detention and arrest, interrogation, search and seizure; exclusionary rules of evidence; motions for continuance, change of venue, and challenges to the jury; problems of the indigent defendant; discovery problems in criminal trials; post-trial appellate procedures. 2 s.h. fall. *Pye*

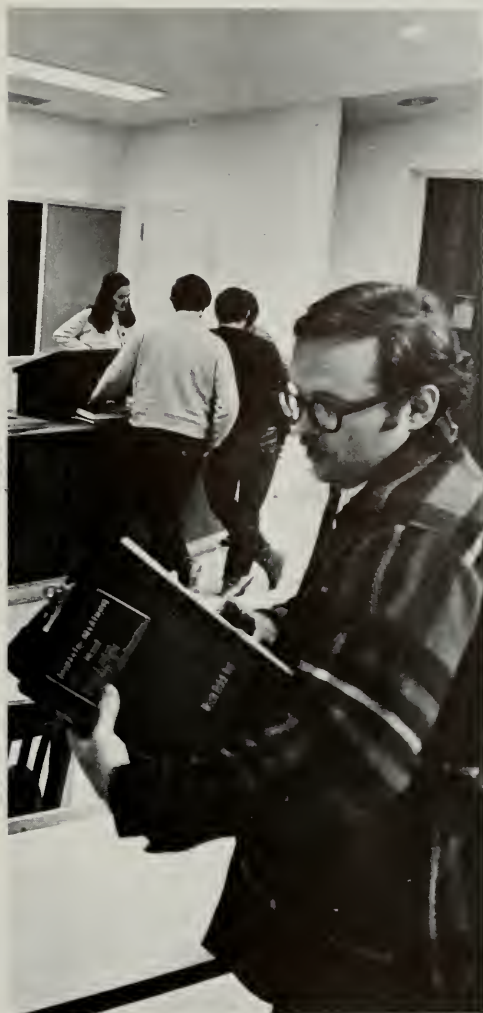
513. Seminar on Decision-Making Under Scientific Uncertainty. A study of governmental decision-making on environmental and public health questions, particularly in those increasingly frequent instances where the scientific evidence on the nature and extent of a hazard or on other aspects of the problem is uncertain and subject to dispute. Attention will be directed to various proposals for institutionalizing technology assessment; the constitution, political accountability, and biases of decision-making agencies; the uses of cost-internalizing pricing strategies and market incentives and disincentives; the potential roles of tort liability and insurance; and opportunities for procedural and evidentiary modifications to improve the quality of decisions. Emphasis will be on case studies of decisions involving such things as pesticides and herbicides; nuclear power plant siting, thermal pollution, and radiation hazards; health effects of air pollution, particularly with respect to leaded gasoline; phosphates and enzymes in detergents; cyclamates and saccharine; and the efficacy and safety of drugs. (Not offered in 1972-73.) 2 s.h. *Havighurst*

515. Seminar in Estate Planning. Seminar devoted to problems and techniques of tax and estate planning. 2 s.h. fall; 2 s.h. spring. *Sparks*

563. Seminar in International Organizations. This course covers the principal legal questions, including current controversies, affecting the United Nations and other international organizations. 2 s.h. spring. *Larson*

566. Seminar in Jurisprudence. An intensive inquiry into specific problems of modern jurisprudential theory 2 s.h. fall. *Christie*

525. Seminar in Labor Law. An intensive examination of significant problems in collective bargaining, union-management relations and labor dispute settlement, with emphasis upon the drafting and interpretation of contract clauses, theories and techniques in contract negotiation, grievance handling, voluntary arbi-



tration and other procedures for the adjustment of disputes, and the interrelation of the legal and economic aspects of labor problems. 2 s.h. fall. *Livengood*

356. Seminar in Law and Political Behavior. A study of the legal aspects of political behavior and the various strategies that may be employed to achieve particular social, economic, and political objectives. Laws governing elections, party affairs, campaign expenditures and voters eligibility will be analyzed. These laws and strategies will be measured against political theory and the processes of value maximization. 2 s.h. spring. *Fleishman*

358. Seminar in Legal Problems of a University. A problem approach to the issues raised by the transaction of business by a University. 2 s.h. spring. *Pye*

527. Interdisciplinary Seminar in Medical-Legal-Ethical Issues. A seminar composed of students and faculty from the Medical, Law, and Divinity Schools for critical consideration of selected pertinent issues of mutual professional interest.

528. Seminar on Legal Issues in Health Care. Beginning with the health care delivery system and the legal problems it presents, the seminar will direct attention to licensing and other controls over physicians and other health personnel, the role of law in the functioning of the health care marketplace, mechanisms for assuring quality of care, proposals for national health insurance or other fundamental reform, and the operation of Medicare, Medicaid, and other financing programs. Additional subjects for inquiry will be the law of medical malpractice and such medical-moral problems as human experimentation, abortion, and sterilization. Problems of public health and the regulation of the drug industry will also be considered. 2 s.h. fall. *Havighurst*

570. Seminar in Military Law. A study of military jurisdiction, the rights of military personnel, the body of both substantive and procedural law that has developed under the Uniform Code of Military Justice; in addition to its other goals, the seminar will seek to develop skills in statutory interpretation and to encourage comparisons between civilian and military criminal law administration. 2 s.h. fall. *Everett*

571. Seminar in Negotiation. This seminar will be limited to twenty students who will participate in mock counseling and negotiation. The problems presented will come from various disciplines with emphasis on business contracts and family problems. The purposes are to practice the arts of counseling and negotiating and to become aware of one's patterns of interaction which facilitate or impede effectiveness as a counselor or negotiator. A short paper on a topic associated with the course will be required. The mimeographed reading materials for the course will consist of writings by lawyers, psychiatrists, and psychologists. 2 s.h. fall. *Marschall*

529. Seminar in Poverty and Law. Lectures and readings cover specific legal problems faced by the indigent in matters of private and public housing, employment, welfare, consumer protection, and in the criminal courts. Topics for research are assigned and papers are presented by participating students. (Not offered in 1972-73.) 2 s.h.

530. Seminar in Psychiatry and Law. An inquiry into the relationship between the science of psychiatry and various legal facets of civil and criminal law, with consideration of the desirability of changes in the law. 2 s.h. spring. *Marschall*

573. Seminar in Racial Discrimination. This seminar examines the legal aspects of the principal areas of racial discrimination—political and legal rights, public accommodations and facilities, education, employment, and housing—with emphasis on recent federal statutes and Supreme Court decisions. 2 s.h. fall. *Larson*

532. Public Law of Foreign Trade. An introduction to the legal and institutional framework governing U.S. trade. Domestically, the emphasis will be on the application of the antitrust laws to foreign commerce, antidumping law, national security exceptions, and adjustment assistance. Of international law, the course will consider primarily the General Agreement on Tariffs and Trade and the Anti-

cles of Agreement of the International Monetary Fund. To the extent time permits, related issues of international investment will also be dealt with. 2 s.h. spring. *Bell*

540. Seminar in Sentencing and Corrections. An examination and discussion of post conviction disposition of criminal offenders. (Not offered in 1972-73.) 2 s.h. *Shimm*

575. Seminar in Sex and the Law. There will be a discussion of discrimination in employment against women and homosexuals, the denial of women's rights to vote and serve on juries, the imposition of legal restrictions and duties on married persons by virtue of their traditional sex roles, differentiations based on sex in adoption and custody cases, legal regulation of birth control and abortion, and criminal sanctions against various sorts of sexual behavior and pornography. The students will attempt to determine to what extent the law has made rational distinctions based on sexual identity or behavior and to identify instances of irrational differentiations. Mimeographed materials covering basic background information and cases will be provided. However, the students themselves will be responsible for securing additional materials for use in the seminar. (Not offered in 1972-73.) 2 s.h. *Marschall*

581. Seminar in Tax Exempt Organizations. A study of the exemption from federal income tax accorded to a variety of public and private organizations and the tax treatment of contributions to such organizations, the public policies underlying the exemption from tax and deductibility of contributions, and the broad new enforcement powers to be undertaken by the Internal Revenue Service. 2 s.h. fall. *Hobbet*

583. Seminar in World Law. The emphasis of this course is on those aspects of national law and international law which have an important influence on weakening or strengthening a world legal order. The course does not duplicate the material in the regular course on International Law. 2 s.h. fall. *Larson*





5

Student Life

Living Accommodations

Housing. The majority of law students, both married and single, live in private, off-campus housing. Apartments in Durham are plentiful and by national standards, inexpensive. A system of excellent roads and the absence of heavy traffic make commuting to the Law School from considerable distances easy. This enables students to choose from a wide variety of housing types. The full range of housing from ultra-modern apartments to rustic cottages are located within minutes of the School. Students desiring to live in off-campus housing may obtain from the Dean's Office in mid-summer a list of similarly situated incoming students with whom they will be able to share housing expenses.

Both married and single students desiring to live off-campus should plan on coming to Durham one to two weeks early to find housing. Because the Law School commences one week before the other graduate schools at Duke, one usually has little difficulty finding both suitable housing and, when desired, roommates.

The Duke University Graduate Center provides accommodations available to men and women law students. Rooms may be reserved by applicants after they have been officially accepted for admission to the Law School. Application for reservations should be made to the Office of Housing Management, Duke Station, Durham, N. C. 27706.

Students enrolled in the Law School may also reside in the Town House Apartments. These are garden apartment units complete with furnishings. There is a swimming pool and other recreational facilities on the premises. Application for reservation should be made at the Office of Housing Management. Rent and deposit details may be found in the section on Financial Information. Each law student who lives in University owned or operated housing is expected to comply with the dormitory rules promulgated by the University and any changes which may from time to time be made to them.

Another possibility for single upperclass male students is being a housemaster on the undergraduate campus for male Duke freshmen. The living accommodations vary according to the dorm to which one is assigned, but usually consists of a single room or a two-room apartment. The position carries with it financial assistance. Interested students should contact the Dean of Undergraduate Men, and interviews are usually held in the spring.

Placement Service

With alumni in every state and in foreign countries, placement of its students has been one of the Duke Law School's most successful endeavors. The Dean and the Associate Dean maintain close contact with outstanding law firms and other potential employers throughout the country.

Duke was the first law school to initiate the *Placement Bulletin*, an idea since adopted by a number of other schools. This *Bulletin*, which is under the editorial supervision of students, lists the members of the prospective graduating class with their pictures, relevant biographical data, and career preferences. This publication is widely circulated among selected law firms, companies, government agencies, and public service organizations throughout the country and has proven an effective part of our placement program.

Placement at Duke is a three-pronged endeavor. The major burden of the on campus placement program is carried by the potential employers themselves through on campus interviewing. Each year more representatives of varied kinds of firms visit the Law School than there are graduates available, and most are seeking more than one student. Quite significantly, the number of interviewers has been rising rapidly in recent years and most of the best known firms in the country will be found on the list. The second program is the maintenance of a lengthy inquiry list by the Placement Office. Firms which cannot interview, but do wish to hire, place their names on this list. In addition, inquiries are received by individual students (through the *Placement Bulletin*) and by the Dean from other firms wishing to hear from students. Frequently mutual interest calls for a brief visit to the firm's offices to become better acquainted with the factors affecting a decision. The third major effort must be made by the students themselves. Third year students, particularly, must be willing to conduct extensive letter writing and visits to areas in which they desire to practice.

Students are involved more deeply in placement activities in the fall of their third year of study. However, most Duke students are placed in various kinds of summer legal internships following the second year. Generally, work in law offices is not available after only one year of law study.

Prizes and Awards

Several academic prizes and awards have been established by the Law School or are sponsored by individuals or organizations to recognize general academic excellence or high achievement in specific areas. The following, although not a complete list, will indicate some of the academic prizes and awards available each year to law students who distinguish themselves.

American Jurisprudence Prize Awards. American Jurisprudence Book awards are made to the student in each course who obtains the highest scholastic grade in that course. These book awards are sponsored yearly by the Lawyers Co-operative Publishing Company.

Corpus Juris Secundum Award. This award, sponsored by the American Law Book Company, is made to the student in each class who has made the most significant contribution to overall legal scholarship.

Hornbook Series Award. This award, sponsored by the West Publishing Company, is made to the student in each class who has obtained the highest scholastic average in his class for the year.

Nathan Burkan Copyright Award. Each year the Nathan Burkan Memorial Competition offers an award of \$250 to the student who writes the best paper on Copyright Law.

Prentice-Hall Tax Prize. An award, sponsored by Prentice-Hall, Inc., is made to the graduating senior who has made the most outstanding record in the courses in federal taxation.

Student Advocacy Award. An award made to the graduating senior, selected by the faculty, who has demonstrated the most outstanding ability in courtroom advocacy. This award is sponsored by the International Academy of Trial Lawyers.

United States Law Week Award. This award is made to a graduating senior selected by the faculty as the student who has made the greatest academic progress during his final year of study. It is sponsored by the Bureau of National Affairs, Inc. and consists of a year's complimentary subscription to *United States Law Week*.

Will Drafting Contest. In order to encourage good draftsmanship of wills, the North Carolina National Bank of Charlotte, North Carolina, each year conducts a will drafting contest which is open to all law students of the University of North Carolina, Wake Forest University, and Duke University who are not already members of the Bar. Prizes of \$50 each are awarded for the two best entries from each law school. The best of these six entries receives an additional award of \$150. The second best entry receives an additional \$50 prize.

Willis Smith Award. This award is presented annually to the member of the graduating class who has achieved the highest academic average for his three years of law study. The award is sponsored by the family of United States Senator Willis Smith, a deceased alumnus, and consists of a set of legal volumes selected by the recipient of the award.

Medical Care

With the exceptions noted below, full medical and surgical care is furnished to all regularly matriculated law students of the University who have paid the semester tuition. This service is under the direction of the physician in charge with the cooperation of the staff of Duke Hospital. It includes hospitalization (limited

to thirty days), medical and surgical care, drugs, dressings, X-ray studies, and ward (but not special) nursing. A charge for board is made at the same rate as in the University dining halls. Refraction of eyes and treatment of teeth and of all chronic and pre-existing conditions, such as diseased tonsils, hernia, elective surgery, chronic skin conditions, and endocrine disturbances, or accidents or illnesses occurring during vacations or while off campus are not included in this service. The cost of any necessary braces and orthopaedic appliances, as well as special nursing, must be borne by the patient. If the student has insurance providing hospitalization, surgical, or medical benefits, these benefits shall be applied to the cost of his medical care. In addition, the University offers a low-cost medical insurance plan similar to Blue Cross and Blue Shield that the married student can purchase to cover medical and surgical care for himself and his family. It should be noted that these plans do *not* cover maternity expenses.

Employment Opportunities for Students and Wives

Although it is not advisable for a law student to undertake any substantial amount of outside work, particularly in the first year, arrangements have been made to provide part-time employment for capable law students who otherwise would be unable to meet the expense of studying law at Duke. A number of positions in the law library are filled by law students. Students are often employed in their second and third years as research assistants for faculty members. The University maintains a general placement office to aid in finding employment, and several law students serve as undergraduate residence advisers if they have been at Duke one year or have previously held such positions.

The opportunities for employment in the University and surrounding community are excellent for wives who are teachers, nurses, or secretaries. Other types of desirable positions are also available. In recent years, about one half of Duke law students have been married. Many of them have been better able to pursue their studies because their wives have been able to contribute to this investment in their futures. The Dean's office maintains a list of superintendents of schools in nearby districts that is available upon request to wives of incoming first year students. The University Personnel Office, 2106 Campus Drive, assists wives with secretarial skills to locate suitable employment.

Professional and Honorary Organizations

Order of the Coif. The Order of the Coif is a national legal scholarship society, with a local chapter at Duke University School of Law. Its purpose is "to foster a spirit of careful study and to mark in a fitting manner those who have attained a high grade of scholarship." Election is restricted to the upper 10 percent of the graduating class who have attained the most distinguished academic records in their law school work.

The Duke Bar Association. The Duke Bar Association coordinates the professional, social, and other extracurricular activities of the student body. The association resembles in its composition and purpose both a university student government and a professional bar association. It manages the speakers program, pub-

licizes Law School activities, and sponsors athletic and social programs. Dues are \$8.00 per annum, payable in September.

Legal Research Program. The Legal Research Program, supervised by a student editorial board, provides second and third year students with an opportunity to prepare legal memoranda on actual problems submitted by practicing lawyers, judges, or legislative committees. The program also assists in providing representation to indigents in appeals from denials of petitions for *habeas corpus* in the United States Court of Appeals for the Fourth Circuit. The briefs are written by the students under the supervision of a member of the faculty who argues the case.

Moot Court Board. The Moot Court Board is comprised of second and third year students, who are chosen on the basis of their performance in intramural Moot Court competition. The Board supervises the Hardt Cup and the Dean's Cup competitions. In addition, the Board provides personnel for teams entering inter-collegiate competition.

International Law Society. The Duke International Law Society provides an annual program for examining the application of international law to world problems. Through a series of lecture discussions in the fall called "A Short Course in International Law" and by featuring distinguished speakers in the field throughout the year, the society provides its members the opportunity to make contact with the men and ideas that are shaping the development of international law.

Other activities include participation the annual Philip C. Jessup International Law Moot Court competition, attendance at conferences sponsored by the Association of Student International Law Societies, and sponsorship of a biennial conference on a selected topic of international significance.

Membership is open to all law students with dues of \$5.00 per annum.

Legal Fraternities. The two legal fraternities at Duke are Hughes Inn of Phi Delta Phi and Wiley Rutledge Chapter of Phi Alpha Delta. During the academic year, these organizations sponsor luncheons and other meetings, which feature topics of professional interest and several social activities.

Recreational Facilities

The University is located about two miles from the business district of Durham on wooded hills constituting part of the 8,000-acre Duke Forest. Within a short distance from the campus are facilities for golf, horseback riding, and woodland hiking. Students of the Law School are entitled to the use of the University gymnasium, tennis courts, swimming pool, golf course, and similar privileges. Other opportunities for physical activity are available in the Intramural Program, as well as through such activity groups as the outing, sailing, and cycling clubs. Skiing has become increasingly popular. Several bowling alleys are available in and near Durham. Concerts, recitals, lectures, and plays are presented frequently on the campus.

Appendix

Former Schools of Duke Law Students

Abilene Christian College	1	Florida Atlantic University	1
Albright College	1	Florida Southern College	1
Allegheny	2	Florida State University	4
American University	1	Fordham	1
Arizona State University	1	Franklin & Marshall College	4
Auburn University	1	Furman	3
Barnard College	1	Georgetown University	4
Bellarmino College	1	George Washington University	3
Belmont Abbey College	1	Georgia State University	2
Beloit College	2	Gettysburg College	4
Birmingham Southern College	1	Grinnel College	1
Bishop College	1	Hamilton College	1
Boston College	6	Harpur College	1
Boston University	2	Harvard	3
Bowling Green University	3	Haverford College	1
Brigham Young University	7	Hobart College	2
Brown University	3	Howard University	1
Bryn Mawr College	1	Indiana University	2
Bucknell University	3	Johns Hopkins University	5
Butler University	1	Kent State University	1
California State University	1	Kenyon College	3
Calvin College	1	Knox College	1
Carleton College	2	Lafayette College	1
Carnegie-Mellon University	1	Lawrence University	1
Carthage College	2	Lehigh University	5
Case Western Reserve University	1	Lewis & Clark	1
Catholic University of America	1	Loras College	1
Central Methodist College	1	Louisiana State University	4
Centre College	3	Loyola University	1
Citadel	2	Macalester College	1
Claremont College	3	Marshall University	1
Clark University	1	Massachusetts Institute of Tech.	1
Coe College	1	Miami University	1
Colgate University	3	Michigan State University	3
College of the Holy Cross	5	Mississippi State University	1
College of William & Mary	5	Monmouth College	1
College of Wooster	1	Mt. Holyoke College	2
Colorado College	1	Mt. Union	1
Concordia College	2	New York College at Brockport	1
Cornell University	4	New York University	2
Dartmouth College	6	North Carolina Central University	1
Davidson College	2	North Carolina State University	3
Denver University	1	Northern Arizona University	1
DePauw University	2	Northern Illinois University	2
Dickinson College	2	Northwestern University	3
Drake University	1	Oberlin College	1
Duke University	39	Occidental College	4
East Carolina University	1	Oglethorpe College	1
East Michigan University	1		
Elon College	1		
Emory University	4		

Ohio Northern University	1	University of Maryland	5
Ohio State University	1	University of Miami	1
Ohio Wesleyan University	1	University of Michigan	4
Olivet College	1	University of Missouri	4
Oregon State University	1	University of Nebraska	1
		University of North Carolina	20
Pennsylvania State University	3	University of Notre Dame	9
Pembroke State University	1	University of Omaha	1
Pomona College	2	University of Oregon	1
Princeton University	5	University of Pennsylvania	7
Providence College	1	University of Pittsburgh	1
		University of Redlands	1
Queens College	2	University of Rochester	1
Radcliffe	1	University of South Carolina	4
Randolph-Macon College	1	University of South Dakota	2
Rice University	1	University of the South	2
Roosevelt University	1	University of South Florida	1
		University of Tennessee	4
Siena College	1	University of Texas	1
Smith College	1	University of Toledo	1
Southern Methodist University	1	University of Victoria	1
Southwest Missouri State College	1	University of Washington	4
Southwestern at Memphis	1	Ursinus College	1
Spring Hill College	1	U.S. Air Force Academy	1
Stanford University	5	U.S. Military Academy	2
Stephens College	1	U.S. Naval Academy	3
Stetson University	1	Utah State	1
St. Olaf College	1		
S.U.N.Y. at Albany	1	Vanderbilt	5
S.U.N.Y. at Buffalo	6	Vassar College	1
Swarthmore College	1	Villanova University	2
Syracuse University	1		
		Wabash College	3
Tennessee State University	2	Wake Forest University	1
Texas Tech. University	1	Washington & Jefferson	1
Thiel College	1	Washington & Lee	3
Transylvania College	1	Washington College	6
Trinity College	2	Wayne State University	1
Tulane University	4	Wesleyan University	1
		West Virginia University	1
Union College	2	Western College	1
U.C.L.A.	3	Western Michigan University	1
University of Alabama	5	Wheaton College	1
University of Arkansas	1	Whitman College	2
University of California	1	Willamette University	1
University of Colorado	1	William Jewell College	1
University of Delaware	2	Williams College	1
University of Denver	1	Wittenberg University	6
University of Florida	6	Wofford	1
University of Georgia	2		
University of Illinois	3	Xavier	2
University of Iowa	4		
University of Kansas	2	Yale	3
University of Maine	1	Youngstown State University	1

Home States of Duke Law Students Enrolled

Alabama	7	Missouri	14
Arkansas	3	Montana	2
Arizona	2	Nebraska	1
California	16	New Jersey	15
Canada	2	New Mexico	1
Colorado	2	New York	52
Connecticut	6	North Carolina	50
Delaware	2	Ohio	27
District of Columbia	6	Oklahoma	1
Florida	26	Oregon	3
Georgia	18	Pennsylvania	33
Hawaii	2	Rhode Island	1
Illinois	16	South Carolina	12
Indiana	8	South Dakota	1
Iowa	11	Tennessee	9
Kansas	3	Texas	6
Kentucky	9	Utah	5
Louisiana	5	Vermont	1
Maine	2	Virginia	11
Maryland	22	Washington	5
Massachusetts	9	West Virginia	5
Michigan	14	Wisconsin	2
Minnesota	6	Belgium	1
Mississippi	4	TOTAL STUDENT BODY	459

Register of Students

THIRD YEAR CLASS (CLASS OF 1972)

Abney, Benjamin C. (University of South Carolina), Columbia, South Carolina
 Adams, William H. (Utah State University), Minneapolis, Minnesota
 Allton, John D. (Bowling Green University), Millersport, Ohio
 Ballbach, John D. (U.S. Naval Academy), Wilmington, Delaware
 Barbour, Thomas C. (University of Denver), Ovando, Montana
 Barlow, Thomas W. (Wayne State University), Hazel Park, Michigan
 Basney, William C. (Indiana University), Cherry Hill, New Jersey
 Bennett, Roberts O. (Harvard), Jacksonville, Florida
 Blake, Ernest L., Jr. (U.S. Naval Academy), South Portland, Maine
 Bohner, Dale K. (Brown University), Tarawa Terrace, North Carolina
 Boyd, Howard M. (Duke University), Gastonia, North Carolina
 Breisblatt, Robert B. (Florida State), Miami Beach, Florida
 Bridgeman, Kenneth S. (Duke University), Richmond, Virginia
 Bronis, Stephen J. (University of Florida), Miami, Florida
 Brousseau, Robert T. (Georgetown University), Biloxi, Mississippi
 Brown, Gregory S. (Brigham Young University), Provo, Utah
 Brown, Luke N. III (University of South Carolina), Ridgeland, South Carolina
 Cameron, Don N. (Ohio University), Cleveland Heights, Ohio
 Carle, Steven (Wabash College), Wyoming, Illinois
 Carr, William P. (University of Georgia), Thomasville, Georgia
 Christensen, Larry E. (University of South Dakota), Hurley, South Dakota
 Christofferson, David T. (Brigham Young University), Orem, Utah
 Clark, Bernard B., Jr. (University of South Carolina), Hampton, South Carolina
 Claxton, Joseph E. (Emory University), McDonough, Georgia
 Cooper, George J. (Willamette University), Atherton, California
 Davidson, Bruce A. (Occidental College), Coronado, California
 Deily, William E. (Drew University), Slingerlands, New York
 Dorsey, Hugh M., III (University of North Carolina), Atlanta, Georgia
 Drake, David A. (University of Iowa), Clinton, Iowa

Ebron, James H. (Duke University), Washington, North Carolina
 Englar, John D. (Duke University), Reisterstown, Maryland
 Erickson, Paul B. (St. Olaf College), Council Bluffs, Iowa
 Frank, Ronald W. (Carnegie-Mellon University), Cheswick, Pennsylvania
 Gallagher, Andrew K. (Georgetown University), Rumson, New Jersey
 Gallwey, William J., III (Louisiana State University—New Orleans), Metairie, Louisiana
 Ganz, Charles D. (Franklin & Marshall), Malverne, New York
 Garrison, James D. (University of North Carolina), Statesville, North Carolina
 Garton, Jeffrey P. (Gettysburg College), Chalfont, Pennsylvania
 Gladstone, Robert M. (Kenyon College), Scarborough, New York
 Gold, Jeffrey L. (New York University), Margate, New Jersey
 Gottlieb, Paul A. (Duke University), Levittown, Pennsylvania
 Guy, Laura J. (Centre College), Anchorage, Kentucky
 Hardee, David W., III (Washington and Lee University), Greenville, North Carolina
 Harris, C. Marcus (Duke University), Winston-Salem, North Carolina
 Henry, Frederick E., III (Duke University), Manchester, Missouri
 Hobgood, Harry L. (Yale University), Durham, North Carolina
 Hoeg, Arthur E., III (Duke University), Arlington, Virginia
 Howell, James C. (Elon College), Franklin, Virginia
 Huff, Richard D. (Baylor University), San Antonio, Texas
 Hughes, William V. (Johns Hopkins University), Muncie, Indiana
 Jackson, Donald H. (Clark University), E. Weymouth, Massachusetts
 Johnson, Samuel W. (Duke University), Hamilton, North Carolina
 Kimpton, William J. (Eastern Michigan University), Ann Arbor, Michigan
 King, Franklin W. (University of Alabama), Huntsville, Alabama
 Klatte, Edward D. (Georgetown College), Richmond, Kentucky
 Kleiman, Carolyn R. (Louisiana State University), New York, New York
 Knott, Hiram (George Washington University), Bronx, New York
 LaSonde, Jack (Bishop College), New York, New York
 Lauren, Jeffrey A. (Johns Hopkins University), Great Neck, New York
 Leiken, Nathan N. (University of Illinois), Minonk, Illinois
 Lewis, L. Burke (Kenyon College), Orlando, Florida
 Liss, David G. (University of Notre Dame), Folsom, Pennsylvania
 Lowell, Cym H. (Indiana University), Bloomington, Indiana
 McAlister, James S. (Oregon State University), Corvallis, Oregon
 McLaughlin, Stephen F. (University of Oregon), Columbus, Mississippi
 McManis, Charles R. (Birmingham-Southern College), Durham, North Carolina
 McManus, Joseph A. (Holy Cross College), Rye, New York
 McWilliams, John G. (Ohio State University), Galion, Ohio
 Madden, Paul C. (Denver University), Arlington, Texas
 Manley, Walter W., II (Florida Southern College), Winter Haven, Florida
 Markley, Sheila M. (Mount Holyoke College), North Canton, Ohio
 Marta, Martin P. (Roosevelt University), Morton Grove, Illinois
 Mason, Daniel S. (U.C.L.A.), Los Angeles, California
 Matusek, Ivan (University of Miami), Falls Church, Virginia
 Michaelson, Robert H. (Beloit College), Creve Coeur, Missouri
 Mills, Amos T., III (Howard University), Greenville, North Carolina
 Moomjian, Cary A., Jr. (Occidental College), Los Angeles, California
 Mueller, Ernst D. (Lehigh University), Carlisle, Pennsylvania
 Neuenschwander, Ted O. (University of North Carolina), Pfafftown, North Carolina
 O'Leary, Eugene C. (Hamilton College), Iowa City, Iowa
 Otte, Alan H. (Duke University), Jacksonville, Florida
 Parker, Susan M. (Occidental College), Sacramento, California
 Parks, Russell W. (Trinity College), Brussels, Belgium
 Parks, Thomas S. (Stanford University), Almond, New York
 Patterson, John W. (Duke University), Jacksonville, Florida
 Payne, Glen A. (S.U.N.Y. at Buffalo), Rochester, New York
 Petersen, Elisabeth S. (Vassar), North Merrimac, Connecticut
 Pierce, J. Wayne (Wofford), Fitzgerald, Georgia
 Portnoy, Jeffrey S. (Syracuse University), East Meadow, New York
 Prasher, Gregory G. (Ohio State University), Mansfield, Ohio
 Pullen, Richard O. (Whitman College), Spokane, Washington
 Ragsdale, Richard W. (University of Florida), Miami, Florida
 Reibman, Edward D. (Lafayette College), Easton, Pennsylvania
 Reisner, Ronald L. (Wesleyan University), West Long Branch, New Jersey

Roeschlaub, Jan V. (Knox College), Denver, Colorado
 Roggeveen, Fred W. (University of Iowa), Iowa City, Iowa
 Rudolf, Richard G. (Queens College), Queens Village, New York
 Salem, Richard J. (Belmont Abbey College), Havelock, North Carolina
 Satula, Anthony E. (Calvin College), Broomall, Pennsylvania
 Scarborough, June D. (University of Alabama), Gadsden, Alabama
 Schollander, Wendell L. (University of Pennsylvania), Jacksonville, Florida
 Sear, Thomas H. (S.U.N.Y. at Buffalo), Rochester, New York
 Sherrill, John A. (University of North Carolina), High Point, North Carolina
 Shortridge, Michael L. (Dartmouth College), Pleasant Hill, Missouri
 Simon, Karla W. (Western College), Clemson, South Carolina
 Smith, David O. (University of Colorado), Snow Hill, North Carolina
 Snider, Richard C. (University of Notre Dame), Garden City, New York
 Stagg, Robert E., Jr. (Emory University), Augusta, Georgia
 Stewart, Daniel C. (Brown University), Convent, New Jersey
 Swan, William H. (Xavier University), Cincinnati, Ohio
 Tanchum, Michael L. (University of Pennsylvania), White Plains, New York
 Tipton, James S. (University of Tennessee), Knoxville, Tennessee
 Tollen, Allen H. (Franklin & Marshall), Chester, Pennsylvania
 Treem, Joshua R. (Johns Hopkins University), Great Neck, New York
 Triplett, Thomas J. (Grinnell College), Durham, North Carolina
 Tucker, Laurence R. (Central Methodist College), Clayton, Missouri
 Ummer, James W. (Thiel College), E. Lansing, Michigan
 Voerman, David P. (College of the Holy Cross), Pleasant Valley, New York
 Wester, John R. (University of North Carolina), Rockingham, North Carolina
 Willis, James E. (University of the South), Naples, Florida
 Winkler, Ronald L. (Duke University), Bethesda, Maryland
 Woodington, Kenneth P. (University of Georgia), Beverly, New Jersey
 Zaelke, Durwood J. (U.C.L.A.), Panorama City, California

SECOND YEAR CLASS (CLASS OF 1973)

Agee, William H. (University of Alabama), Pine Hill, Alabama
 Albright, Stuart A. (University of North Carolina), Gastonia, North Carolina
 Armstrong, Kenny W. (Tennessee State University), Atoka, Tennessee
 Avery, William H. (Southern Methodist University), Pecos, Texas
 Axi, Tony L. (Duke University), Atlanta, Georgia
 Barty, Lawrence J. (Florida State University), Miami, Florida
 Bayliss, William H. (Harvard University), Kalamazoo, Michigan
 Biddlecome, George W. (Wittenberg University), Columbus, Ohio
 Blue, Daniel T., Jr. (North Carolina Central University), Baltimore, Maryland
 Boyd, Robert W. (Alma College), Midland, Michigan
 Bradford, Dana G., II (University of Florida), Sebring, Florida
 Bretz, Leslie S. (Pomona College), Durham, North Carolina
 Brobst, Donald H. (Gettysburg College), Shickshinny, Pennsylvania
 Brody, Raymond D. (University of Pennsylvania), Nas Quonset Point, Rhode Island
 Brown, Charles M., Jr. (Brigham Young University), Monticello, Utah
 Browning, Jackson B., Jr. (Duke University), Scarsdale, New York
 Burns, Byron B., Jr. (Furman University), Greenwood, South Carolina
 Calaway, Richard B. (University of Arkansas), Batesville, Arkansas
 Cardman, Philip N. (Washington University), Pelham, New York
 Carney, John R. (Olivet College), Olivet, Michigan
 Chewning, Richard L. (Concordia College), Blue Earth, Minnesota
 Ciccarone, Michael J. (Youngstown State University), Warren, Ohio
 Cooper, James M. (University of Omaha), Aiea, Hawaii
 Corvette, Theodore E., Jr. (University of Delaware), Myrtle Beach, South Carolina
 Crane, Peter G. (Harvard University), Washington, D. C.
 Craska, Roger E. (University of Notre Dame), Pittsburgh, Pennsylvania
 Crouch, John E. (Dartmouth College), Gardner, Massachusetts
 Cureton, Kenneth A. (Duke University), Anderson, South Carolina
 Dean, Rheta K. (Randolph-Macon College), Lexington, Virginia
 Dellinger, Anne M. (University of North Carolina), Durham, North Carolina
 Dickson, Kenneth C. (University of Kansas), Topeka, Kansas
 Dietz, Robert A. (Lehigh University), Huntington, New York
 Drutchas, Gregory G. (University of Michigan), Birmingham, Michigan
 Dudley, Stewart R. (University of Alabama), Birmingham, Alabama

Economou, Deno G. (Davidson College), Charlotte, North Carolina
 Eitrem, Anthony C. (Carleton College), Northfield, Minnesota
 Ellis, Ronald D. (U.C.L.A.), Palm Desert, California
 Epstein, Richard A. (S.U.N.Y. at Albany), Sag Harbor, New York
 Fahey, William T. (University of Notre Dame), Weirton, West Virginia
 Farmer, Duncan J. (Catholic University), Brentwood, New York
 Fitzgerald, Donald J. (University of North Carolina), Bowie, Maryland
 Fitzgerald, E. Cole (College of the Holy Cross), Newburyport, Massachusetts
 Foster, Mark S. (University of Missouri), Edgerton, Missouri
 Fridy, Carl H. (Trinity College), Rosemont, Pennsylvania
 Fulton, William H. (University of North Carolina), Louisville, Kentucky
 Gambol, Robert A. (Boston College), Mentor, Ohio
 Gibble, Sherrie L. (Gettysburg College), Flemington, New Jersey
 Gibson, Dean (Duke University), Chesapeake, Ohio
 Gradoville, Robert T. (Loras College), Cedar Rapids, Iowa
 Greene, Stephen W. (Florida State University), St. Petersburg, Florida
 Haddy, Larry G. (University of Iowa), Cedar Rapids, Iowa
 Hale, Lee L. (Spring Hill College), Mobile, Alabama
 Hall, C. Wells, III (North Carolina State University), Mt. Ulla, North Carolina
 Hamilton, Palmer C. (University of Alabama), Mobile, Alabama
 Hancock, John P. (University of Notre Dame), Waverly, Kentucky
 Handler, Eric P. (Duke University), Durham, North Carolina
 Harrington, Sarah (Duke University), McLean, Virginia
 Hassell, Robert A. (Transylvania College), E. Greenwich, Rhode Island
 Heller, Lawrence I. (Cornell University), Greensboro, North Carolina
 Herman, Howard J. (Washington & Lee University), W. Hempstead, New York
 Highland, William D. (Cornell University), Clarksburg, West Virginia
 Hill, William E. (Tulane University), New Orleans, Louisiana
 Hillman, Robert W. (California State College), Lakewood, California
 Holton, Charles R. (Abilene Christian College), Washington, D. C.
 Hopkins, Edward J. (Xavier University), Middletown, Ohio
 Hostetler, Daniel J. (Wittenberg University), Smithville, Ohio
 Hunt, Betty Jo (Pembroke State University), Fairmont, North Carolina
 Janke, Ronald R. (Wittenberg College), Lima, Ohio
 Johnson, Bruce H. (Duke University), Deluth, Minnesota
 Johnson, Malcolm D. (Princeton University), Bronxville, New York
 Kazary, Robert O. (Bucknell University), Doylestown, Pennsylvania
 Kelley, Patrick W. (Michigan State University), Southgate, Michigan
 Kennard, Raeburn G. (Brigham Young University), Farmington, Utah
 Kennedy, Richard M. (Wofford College), Jacksonville, Florida
 Kennelly, Dennis L. (College of the Holy Cross), Bethesda, Maryland
 Kingsley, George M. (Cornell University), Newfield, New York
 Kinney, Eleanor (Duke University), Durham, North Carolina
 Kinsbourne, Carol W. (College of William & Mary), Durham, North Carolina
 Koepff, Paul R. (Lehigh University), Morris Plains, New Jersey
 Kurtz, William L. (Michigan State University), Onsted, Michigan
 Lamberth, Jerry M. (Vanderbilt University), Somerset, Kentucky
 Langer, Lawrence J. (University of Pittsburgh), Mt. Brook, Alabama
 Lavine, Sherrie L. (University of Maryland), Adelphi, Maryland
 Leckar, Stephen C. (Georgia State University), Atlanta, Georgia
 Leithiser, Robert S. (Massachusetts Institute of Technology), Charleston, West Virginia
 Love, George T., III (Princeton University), Louisville, Kentucky
 Luebchow, James E. (Northern Illinois University), Lincoln, Illinois
 Lumer, Joel V. (Harpur College), Binghamton, New York
 Luther, Pamela G. (University of North Carolina), Monroe, North Carolina
 Malik, Thomas W. (Northwestern University), Park Ridge, Illinois
 Martin, Patrick H. (Louisiana State University), Bastrop, Louisiana
 Masters, Jay W., II (Stetson University), Miami, Florida
 Mattox, Phillip R. (Northern Arizona University), Flagstaff, Arizona
 Mayer, Donald O. (Kenyon College), Berkeley Heights, New Jersey
 McDonough, Thomas F. (John Hopkins University), Baltimore, Maryland
 Moyer, Charles R. (Albright College), Perkasio, Pennsylvania
 Moyer, Joseph W. (Dickinson College), Horsham, Pennsylvania
 Naftzinger, David J. (University of Pennsylvania), New Cumberland, Pennsylvania
 Nickloy, Jeffrey S. (Wabash College), Toledo, Ohio

Nickolai, Kenneth A. (Carthage College), Papillion, Nebraska
 Parlato, Charles A. (Washington & Jefferson College), Fredonia, New York
 Parrish, Randolph B. (University of Redlands), Santa Ana, California
 Parsons, Allan P. (Florida Atlantic University), W. Palm Beach, Florida
 Paulus, Daniel C. (Ohio Northern University), Marion, Ohio
 Peterson, David F. (Coe College), Indianola, Iowa
 Petrozella, Philip W. (University of Florida), Coral Springs, Florida
 Pfaffly, Phillip A. (Drake University), Clinton, Iowa
 Phelan, Calvin R. (Vanderbilt University), Hobart, Oklahoma
 Phillips, Glenn S. (University of Pennsylvania), Rumson, New Jersey
 Plautz, Daniel M. (Carthage College), Hannibal, Missouri
 Poag, John H. (Oglethorpe College), Leland, Mississippi
 Pomeroy, John J. (Boston College), Brockton, Massachusetts
 Pope, Michael H. (Tulane University), St. Petersburg, Florida
 Portune, Robert E. (Miami University), Kettering, Ohio
 Previs, John R. (Boston College), Bethel Park, Pennsylvania
 Ramey, Malcolm S. (DePauw University), Toledo, Ohio
 Ray, James C. (Duke University), Ashburn, Georgia
 Reed, Roger (Stanford University), Haiti, Missouri
 Reeves, Frank H. (Yale University), Nashville, Tennessee
 Reish, Andrew F. (Lehigh University), Lewisburg, Pennsylvania
 Ritti, Eugene A. (Villanova University), Malvern, Pennsylvania
 Robertson, Calder L., Jr. (University of Texas), Converse, Texas
 Robertson, Roy R., Jr. (University of Maryland), Beltsville, Maryland
 Rohrich, Richard P. (Wittenberg University), Akron, Ohio
 Roscetti, James C. (S.U.N.Y. at Buffalo), Niagara Falls, New York
 Rosen, Larry J. (Hobart College), Brooklyn, New York
 Russell, Nancy A. (Duke University), Hagerstown, Maryland
 Schenck, Peter F. (Dartmouth), Westmont, New Jersey
 Schmidt, Steven E. (Case Western Reserve University), Mansfield, Ohio
 Scott, Cheryl L. (College of William & Mary), Alexandria, Virginia
 Shaw, Nancy R. (Duke University), Hagerstown, Maryland
 Simon, Leonard B. (Union College), West Hartford, Connecticut
 Skinner, Halcyon (Western University), Hartsdale, New York
 Smith, Charlotte M. (Macalester College), Cedar Falls, Iowa
 Sneed, Albert L., Jr. (University of North Carolina), Pinehurst, North Carolina
 Sparks, William J. (University of Victoria), Victoria, B.C., Canada
 Speidel, Bruce E. (Princeton University), Royal Oak, Michigan
 Spiegelberg, Frank D. (Kent State University), Silver Spring, Maryland
 Starling, Kenneth G. (University of North Carolina), High Point, North Carolina
 Starr, Kenneth W. (George Washington University), San Antonio, Texas
 Stewart, Michael J. (University of South Carolina), Greenville, South Carolina
 Stewart, Richard W. (Franklin & Marshall College), Camp Hill, Pennsylvania
 Swan, Carolyn P. (Vanderbilt University), Atlanta, Georgia
 Talbot, Susan C. (Smith College), Joliet, Illinois
 Tanchum, Lettice W. (Duke University), Scarsdale, New York
 Thomas, Robin C. (University of Washington), Forks, Washington
 Timm, John (Boston College), Bronx, New York
 Titley, Robert L. (University of Michigan), Tecumseh, Michigan
 Turk, Hugh M. (College of the Holy Cross), Woodside, New York
 Twiddy, Curtis A. (University of North Carolina), Greensboro, North Carolina
 Volk, John D. (Claremont College), Burlingame, California
 Vose, Marvin R. (University of Iowa), Iowa City, Iowa
 Walter, William E. (Villanova University), Stroudsburg, Pennsylvania
 Warner, James R., Jr. (Duke University), Fayetteville, North Carolina
 Weddington, Michael E. (University of Florida), Charleston, South Carolina
 Weisenberger, Ronald J. (Ohio State University), Columbus, Ohio
 Weston, Ralph B. (North Carolina State University), Miami, Florida
 White, Edward D., III (Bellarmine College), Louisville, Kentucky
 Wiener, Howard C., III (Ohio Wesleyan University), Trucksville, Pennsylvania
 Wilder, Raboteau T. (Wake Forest University), High Point, North Carolina
 Williams, Donald R. (American University), Wilmington, Delaware
 Williams, Thomas A. (Whitman College), Walla Walla, Washington
 Williamson, John T. (U. S. Naval Academy), Durham, North Carolina
 Wilson, Herbert H. (Vanderbilt University), Memphis, Tennessee

Wright, Paul M. (Wheaton College), Canton, North Carolina
 Young, Laurence A. (University of Washington), Seattle, Washington
 Zimmer, Paul E. (University of Notre Dame), Dayton, Ohio
 Zimprich, James B. (Dartmouth College), Milwaukee, Wisconsin

FIRST YEAR (CLASS OF 1974)

Adams, Alfred G. (Duke University), Richmond, Virginia
 Adler, Kenneth P. (University of Rochester), Manhasset, New York
 Anna, Donald D. (Colgate University), Boonville, New York
 Bailly, John P. (Siena College), Albany, New York
 Ball, Edna F. (Ursinus College), Perkiomenville, Pennsylvania
 Barco, Susan E. (Allegheny College), Durham, North Carolina
 Beane, John C. (University of North Carolina-Chapel Hill, Durham, North Carolina
 Beaumier, Robert G., Jr. (University of Washington), Portland, Oregon
 Becton, Brenda C. (Duke University), Greensboro, North Carolina
 Belway, Joel K. (Pomona College), San Francisco, California
 Bennett, William P. (Princeton University), Chevy Chase, Maryland
 Berry, James W., Jr. (Vanderbilt University), Lexington, Kentucky
 Binder, Charles E. (Western Michigan University), Kalamazoo, Michigan
 Black, Thomas W. (University of Kansas), Hiawatha, Kansas
 Boesch, Philip W., Jr. (Brown University), Providence, Rhode Island
 Borchert, William P. (Trinity College), Madison, Connecticut
 Bracy, Evelyn C. (Louisiana State University), New Orleans, Louisiana
 Bremer, John M. (Fordham University), Meriden, Connecticut
 Briske, Heinz J., (Monmouth College), Flossmoor, Illinois
 Brown, Colin W. (Williams College), Yonkers, New York
 Brown, Raymond F. (Centre College), Lexington, Kentucky
 Burhmann, David L. (Beloit College), Aurora, Illinois
 Byers, Joan H. (Emory University), Charlottesville, Virginia
 Calderwood, Terry W. (Boston University), Camden, Maine
 Cappel, Tim R. (University of Missouri), Wright City, Missouri
 Carroll, Candace M. (George Washington University), Washington, D.C.
 Chase, Robert R. (Dartmouth College), Dennisport, Massachusetts
 Chernak, Ronald V. (University of Notre Dame), Flossmoor, Illinois
 Ciompi, Niccolo A. (University of North Carolina-Chapel Hill), Durham, N. C.
 Cochran, Robert P. (Centre College of Kentucky), Maysville, Kentucky
 Cohen, Philip G. (New York University), Bronx, New York
 Coleman, Donna R. (University of Michigan), Port Clinton, Michigan
 Collier, Curtis (Tennessee State University), Mariana, Arkansas
 Conklin, Mary A. (SUNY at Buffalo), Stony Point, New York
 Corkery, Ronald E. (Lehigh University), Allentown, Pennsylvania
 Corson, Kenneth S. (Dickinson College), Trenton, New Jersey
 Davidson, Kenneth H. (Duke University), Billings, Montana
 Decker, John A. (University of Nebraska), Saginaw, Michigan
 Dempsey, Gordon B. (Wabash College), Indianapolis, Indiana
 Dennis, Stephen N. (University of North Carolina-Chapel Hill), Kensington, Ga.
 Drennan, James C. (Furman University), McCormick, South Carolina
 Dryer, Raymond C. (Carleton College), Duluth, Minnesota
 Dunn, Andrew D. (Columbia University), Swampscott, Massachusetts
 Dwyer, John V., Jr. (Boston College), Brighton, Massachusetts
 Earls, Thomas A. (Hobart College), Webster, New York
 Edwards, John W., II. (Colgate University), Williamsport, Pennsylvania
 Elliott, Stephen L. (Stanford University), Roswell, New Mexico
 Escott, Durant W. (Radcliffe College), Vershire, Vermont
 Esping, Theodore J. (University of Florida), Hobart, Indiana
 Feiner, Stuart F. (University of Pennsylvania), New York, New York
 Ferland, Roger K. (Lewis & Clark), Phoenix, Arizona
 Fox, John K. (Boston College), Baltimore, Maryland
 Freed, Richard H. (University of Maryland), Silver Spring, Maryland
 Freeman, Richard M. (Claremont Men's College), Claremont, California
 Fulton, Fred W. (Southwest Missouri State College), Springfield, Missouri
 Galloway, Karen B. (East Carolina University), Raleigh, North Carolina
 Gamble, John B. (University of North Carolina-Chapel Hill), Macon, Georgia
 Getchell, Earle D., Jr. (Emory University), Mobile, Alabama
 Gladson, Neil S. (University of Washington), Sunnyside, Washington

Glass, Richard C. (Duke University), Cranbury, New Jersey
 Gombert, Steven W. (University of Maryland), Silver Springs, Maryland
 Good, James G. (University of Maine), East Sebago, Maine
 Gostin, Lawrence O. (New York College at Brockport), Brockport, New York
 Gregg, Robert E. (United States Military Academy), Wyomissing, Pennsylvania
 Hanudel, Robert A. (University of Toledo), Toledo, Ohio
 Hardin, James C. (Wofford College), Rock Hill, South Carolina
 Harris, Ellie G. (Duke University), Washington, D.C.
 Harris, James W. (Princeton University), Atlanta, Georgia
 Haufe, Stephen D. (Carleton College), Bloomfield, Iowa
 Healy, William P., (University of California), Torrance, California
 Hecht, Alan S. (College of William and Mary), East Meadow, New York
 Henderson, Robert F. (Texas Tech University), Taylor, Texas
 Henschel, George L. (Cornell University), Franconia, New York
 Hillier, David R. (University of the South), Wheaton, Illinois
 Hogue, Louis Lynn (William Jewell College), Raleigh, North Carolina
 Holshouser, Donna (University of Illinois), Urbana, Illinois
 Horvath, David E. (Bowling Green State University), Pittsburgh, Pennsylvania
 Houghton, Eric A. (University of Southern Florida), Denedin, Florida
 House, Robert H. (University of Missouri), Aurora, Missouri
 Jernigan, Jerry W. (Duke University), Greensboro, North Carolina
 Kaufman, Mark D. (Northwestern University), University City, Missouri
 Kofman, Robert T. (Pennsylvania State University), State College, Pennsylvania
 Kovacs, Arpad de (United State Military Academy), Lakeview, Oregon
 Lassiter, Paul L. (North Carolina State University), Raleigh, North Carolina
 Laudenslager, Janet K. (Alleghany College), Jamestown, New York
 Lawson, Richard C. (College of William and Mary), Perry, Georgia
 Leister, Craig D. (Bowling Green State University), Alliance, Ohio
 Lesniak, Edward J. (DePauw University), Chicago, Illinois
 Levin, Jay J. (Gettysburg College), Baltimore, Maryland
 Lockett, Mary A. (University of Tennessee), Knoxville, Tennessee
 Lowden, David W. (Claremont Men's College), Littleton, California
 Lowry, Lawrence B. (Marshall University), New Port Richey, Florida
 Mandelkern, Irwin (Tulane University), Tallahassee, Florida
 Marion, Patricia H. (Wittenberg University), Baltimore, Maryland
 Marquette, Ronald M. (United States Air Force Academy), Colorado Springs, Colorado
 Massie, Herb P. (Haverford College), Laurel, Maryland
 McAllister, Kenneth W. (University of North Carolina-Chapel Hill), High Point, N.C.
 McBride, Michael (Duke University), LaGrange, Georgia
 McDermott, Edward A., Jr. (Colgate University), Washington, D.C.
 McLain, Susan L. (University of Pennsylvania), Chestertown, Maryland
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MAP OF DUKE UNIVERSITY

East Campus

- | | | | |
|---|-------------------------|----|----------------------|
| A | Baldwin Auditorium | O | Pegram House |
| B | Bassett House | P | Duke Press |
| C | Brown House | Q | Infirmary |
| D | Union Building | R | Ark |
| E | Faculty Apartments | S | Crowell Building |
| F | Art Museum, Geology | T | Epworth Inn |
| G | Aycock House | U | Gilbert Addoms House |
| H | East Duke Building | V | Southgate Hall |
| I | West Duke Building | W | Campus Center |
| J | Jarvis House | X | Woman's College |
| K | Carr Building | Y | Gymnasium |
| L | Giles House | Z | Asbury Building |
| M | Woman's College Library | AA | Bivins Building |
| N | Alsapough House | BB | Art Building |
| | | | Branson Building |



West Campus

- | | | | | | | | |
|---|-------------------------------------|---|---------------------------------------|---|----------------------------------|----|--|
| A | Duke Chapel | H | Hospital Main Entrance | O | Craven Quadrangle | V | Card Gymnasium |
| B | Divinity School | I | Gerontology, D & T, Clinical Research | P | Wannamaker Hall | W | Indoor Stadium |
| C | Gray Building | J | Duke Hospital | Q | Crowell Quadrangle | X | School of Law |
| D | Perkins Library | K | Sociology, Psychology | R | Clock Tower Court | Y | Gross Chemical Laboratory |
| E | Language Center | L | Social Sciences | S | Kilgo Quadrangle | Z | Biological Sciences |
| F | Old Chemistry Building | M | Allen Building | T | Union Building | AA | Plant Environment Laboratory |
| G | Davison Building School of Medicine | N | Few Quadrangle | U | Flowers Building Page Auditorium | BB | Physics Building |
| | | | | | | CC | Nuclear Laboratory |
| | | | | | | DD | School of Engineering |
| | | | | | | EE | Army Research |
| | | | | | | FF | Medical Center Research Buildings |
| | | | | | | GG | Nanaline H. Duke Medical Sciences Building |
| | | | | | | HH | Warehouse, Shop |
| | | | | | | II | Bell Building |
| | | | | | | JJ | Hanes House |
| | | | | | | KK | School of Nursing |
| | | | | | | LL | Hanes House Annex |
| | | | | | | MM | Pickens Rehabilitation Center |
| | | | | | | NN | Graduate Center |
| | | | | | | OO | Alumni House |
| | | | | | | PP | Commonwealth-Studies Center |
| | | | | | | QQ | Personnel Office |
| | | | | | | RR | International House |
| | | | | | | SS | Personnel Office |
| | | | | | | | Education Improvement Program |
| | | | | | | TT | A Better Chance Program |
| | | | | | | UU | International Studies Center |
| | | | | | | VV | Campus Stores Office |
| | | | | | | WW | Office of Institutional Advancement |
| | | | | | | XX | Information Services |
| | | | | | | YY | Visitors Bureau |
| | | | | | | ZZ | Admissions Office |
| | | | | | | | Edens Quadrangle |
| | | | | | | | Wade Stadium |



BULLETIN OF DUKE UNIVERSITY
The School of Law

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Physician's Associate
Program



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Calendar of Physician's Associate Program

1972

August

- 25 Friday—Rotations end for second year students
- 28 Monday—Board examinations begin for second year students
- 30 Wednesday—Board examinations end; registration begins 9 a.m. for new students
- 31 Thursday—Graduation ceremonies

September

- 4 Monday—Labor Day, no classes
- 5 Tuesday—Classes begin

November

- 22 Wednesday—Thanksgiving recess begins for first year students
- 27 Monday—Classes resume

December

- 15 Friday—First semester classes end
- 18 Monday—Examinations begin
- 20 Wednesday—Examinations end

1973

January

- 15 Monday—Second semester classes begin

March

- 17 Saturday—Spring vacation begins for first year students only
- 26 Monday—Classes resume

May

- 4 Friday—Second semester classes end
- 7 Monday—Examinations begin
- 11 Friday—Examinations end
- 12 Saturday—Summer vacation begins for first year students
- 26 Saturday—Summer vacation begins for second year students
- 28 Monday—Clinical rotations begin for first year students

June

- 4 Monday—Outside physician rotations begin for second year students

July

- 28 Saturday—Rotations end for second year students
- 30 Monday—Board examinations begin for second year students

August

- 1 Wednesday—Board examinations end
- 2 Thursday—Graduation ceremonies

University Administration

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1

General Information

History and Background

More than a decade ago specialists at Duke Medical Center concerned with the application of new diagnostic and therapeutic procedures found they could safely and effectively delegate many of their tasks to non-physicians, thereby extending their services to a greater number of patients. Because of the scarcity of nurses and allied health professionals, the specialists relied primarily on ex-military corpsmen, with previous health related education and experience, who did not fit readily into the civilian health care system.

At the same time the plight of the overworked primary care practitioner was becoming manifest, and Dr. Eugene A. Stead, Jr., then Chairman of the Department of Medicine at Duke, recognized the potential of the corpsmen experiment and concluded that the specialists' use of military paramedical personnel might be readily adapted to solve the dilemma of the primary care physician.

Early Conclusions. As a result, an *ad hoc* committee was appointed to evaluate the manpower needs of the health services industry and the effectiveness of the existing educational programs as they related to those needs. The committee concluded that: (1) there was a need for extensive numbers of highly trained technical personnel both within and outside the Medical Center; (2) two types of allied health personnel were needed, one very highly skilled in a specific area and the other a more broadly educated individual with a sophisticated background in general medical concepts; (3) there was a need for a core curriculum that would permit academic achievement and variation in careers; (4) an attempt to define specific solutions that could resolve individual manpower problems was essential; and (5) there should be a method of attracting career oriented, qualified candidates to the health services industry and providing them with a functional, progressive, and compact curriculum.

Because of the complexities of medical practice and the changing patterns of health care delivery, it was decided not to develop a task-oriented training program. Rather, a basic medical curriculum at the undergraduate level was formulated

so that graduates would possess a broad understanding of theoretical and scientific concepts. This was preferred since it would allow the graduate to continue to function effectively for ten or twenty years when current task-oriented skills would probably be outmoded. Another factor considered in this decision was that defining the role would be impossible, since every physician performs somewhat differently from every other physician.

First Class. In 1965 four candidates, all of whom were ex-corpsmen, were selected to begin the course work designed to educate physician's assistants. These individuals were chosen for several reasons. Primary among them were that they brought with them a background of education and experience that had motivated an interest in caring for sick people and were thus inclined to pursue a full-time career in the health field; and as representatives of an unused manpower resource it was not necessary to recruit candidates from the field who were already in short supply.

Although initial efforts were directed solely toward ex-military corpsmen, it was also realized that many members of the established intermediate level health professions had the desire and ability to assume greater patient care responsibilities. Development of the physician's assistant concept as a means of professional advancement for these people has since encouraged capable young adults to pursue careers in the health services who otherwise would have seen no alternative but to adopt unrelated careers having more obvious means of advancement.

Developmental Phase. During the early developmental stage of the program the curriculum was expanded so that the first nine months would meet the needs of all disciplines from family practice to radiology and pathology. This expansion took place as physicians in other specialties began to demand professional assistants. In keeping with the original objective, however, the emphasis of the clinical teaching has continued to be in the primary care specialties of family practice, internal medicine, and pediatrics.

During its developmental phase, the program at Duke was accorded national attention. Because of the popularity of the concept, institutions and groups across the nation established a variety of "physician's assistant" programs; soon the title assumed a generic connotation referring to all nonphysicians trained to extend physician's services by assuming responsibilities traditionally undertaken exclusively by physicians. Officially, the American Medical Association defined the physician's assistant as "a skilled person qualified by academic and practical on-the-job training to provide services under the supervision and direction of a licensed physician who is responsible for the performance of that assistant." Although this definition emphasizes the unique characteristics of the physician's assistants accountability, it encompasses all levels of such assistants currently being graduated from programs which range in length between four hours and five years.

The Type A Physician's Assistant. Investigation of the issues related to physician's assistants of the National Academy of Sciences resulted in the definition of three basic types of physician's assistants. One of the types the Board defined is the assistant who possesses a broad understanding of medicine and

. . . is capable of approaching the patient, collecting historical and physical data, organizing these data, and presenting them in such a way that the physician can visualize the medical problem and determine appropriate diagnostic or therapeutic steps. He is also capable of assisting the physician by performing diagnostic and therapeutic procedures and coordinating the roles of other,



more technical, assistants. While he functions under the general supervision and responsibility of the physician, he might, under special circumstances and under defined rules, perform without the immediate surveillance of the physician. He is, thus, distinguished by his ability to integrate and interpret findings on the basis of general medical knowledge and to exercise a degree of independent judgment.

In an effort to avoid the confusion associated with the term *physician's assistant*, Duke University and other institutions with programs designed to produce assistants of this type have changed their program titles to *physician's associate*. Thus, the above described type of physician's assistant is becoming known as the *physician's associate*.

Specifically, physician's associates are taught to elicit detailed patient histories, perform comprehensive physical examinations, and collect and interpret data from intricate technical procedures including gastric analyses, venous and

arterial punctures, bone marrow examinations, lumbar punctures, pulmonary function studies, and electrocardiographic tracings. In addition, physician's associates provide patient care services such as cast application and removal, wound suturing, dressing changes, after-hours laboratory studies, and assessing and monitoring the progress of ill patients.

General Flexibility. Because of their geographic mobility, physician's associates are able to provide valuable and flexible support for physicians. When the physician is in his office, the physician's associate can be in the hospital performing routine patient workups, completing narrative case summaries, and scheduling and explaining diagnostic procedures to hospitalized patients. In the office, he can help promote efficiency by collecting data for the physician ahead of time so that actual physician-patient contact can be spent in a more meaningful manner. In the home, the physician's associate can be adjunct to the physician, functioning as a data gatherer and assisting in the routine management of invalid patients. Another characteristic making physician's associates particularly valuable to the primary care physician is that they are available at any hour needed to help the physician.

Thus, university-trained physician's associates are beneficial in many ways. First, they are able to supplement currently available health team talents. Second, because the curriculum has been developed to supplement the knowledge and skills of people with training and experience in the health field, it has provided an opportunity for vertical career mobility for those who have the desire and ability to assume greater responsibilities in the area of patient care but who do not have the desire or opportunity to become a doctor. Third, physician's associates are able to extend significantly a physician's ability to provide more comprehensive services to a greater population base. Fourth, by performing tasks and providing services that do not require the physician's sophisticated background, the physician's career is more challenging and stimulating. The benefits of this new concept have already been so extensive that it can be stated safely that the physician's associate is here to stay.

Legal Issues and Legislation

When the Duke program was initiated it was recognized that the use of a new type of manpower in the health field might present legal difficulties in view of the licensing schemes for medical personnel. Under their legislative power to protect the health and safety of the public, state governments have enacted licensure laws to regulate the practice of medicine. These laws are typically phrased to authorize qualified physicians to perform all health care functions. Various other categories of health professionals are granted more circumscribed licenses enabling them to independently perform certain functions for which they are qualified by training and experience. Although licensure laws for allied health professionals were often merely permissive when first enacted (preventing only the use of a given title by the unlicensed), in many instances they have become mandatory, making any activity within the scope of a licensed profession by one not licensed by that profession a criminal act.

The initial question faced by the program was, therefore, whether the graduates' activities would infringe upon the sphere by persons performing under mandatory licenses. The problem was considered by the North Carolina Attorney Gen-

eral, who in 1966 issued an advisory opinion that the performance of the projected physician-supervised activities would not contravene the licensure laws of the State. The program operated with reliance on that opinion until July, 1971. At that time North Carolina enacted an exception to its Medical Practice Act for physician's assistants.

Custom and Usage. If assistants would perform any functions without the supervision and direction of a responsible licensed physician, such actions would constitute the unlicensed practice of medicine and leave the assistant subject to criminal prosecution. The role of physician's assistants is, however, *dependent*—under the supervision of the physician. In this way it is the physician who actually “practices medicine.” In view of the expertise required in such practice—an expertise which legislatures and courts do not have—the medical profession is able to set its own standards by reference to the ordinary practices of the profession. If employment of such dependent personnel is a customary practice, even among a respectable minority of physicians, the danger of litigation in states where legislatures have yet to approve specific exceptions for physician's assistants should be minimal. Furthermore, the position of the physician's assistant as well as the supervising physician is enhanced as a greater number of all types of assistants are used and accepted within the medical community.

Although in most states a custom and usage sanction for dependent assistants could be developed over a period of time, this protection, dependent on expert testimony and a jury determination in each individual case, would not be adequate in the long term for prospective employing physicians. Because a more specific legal sanction was deemed desirable, people connected with the Duke program began to investigate the possibility of developing legislative recognition for trained assistants.

Model Legislation Project. In 1969, a year-long project—sponsored by the Department of Health, Education and Welfare—was conducted by Duke's Department of Community Health Sciences to determine the most desirable and feasible means of accommodating all types of physician's assistants into the legal framework of medical practice. The ultimate objective of the project was to develop a model legislative proposal which, if enacted by the states, would further regularize the position of physician-trained assistants.

Two primary ideas dominated the discussion at the conferences held as part of the project. First, it was agreed that, because the nature of the role is ill-defined and because the concept is still in the formative stage, any legislation should preserve the maximum flexibility consonant with safeguarding patient welfare. Second, because physician's assistants work closely with physicians (who are also liable for the actions of their assistants), the participants felt that the physician should be relied on as the principal regulator of the assistants activities. The approach ultimately agreed on was to encourage the enactment of an exception to a state's Medical Practice Act, making it clear that physicians may delegate tasks to assistants as long as they exert responsible supervision and control of such delegated tasks. With such an approach, the physician could determine what tasks were to be performed by his assistant, considering the needs of his practice and the particular qualifications of his assistant. Quality of care would be safeguarded by the continuing vigilance of the physician.

Enacted Legislation. By the end of 1971, nineteen states had enacted specific statutes legalizing the activities of physician's assistants. Several state legis-

latures are currently considering similar legislation. Legislative sanctions, it should be noted, go far toward permanently establishing physician's assistants in the health care team as well as helping curb any lingering doubts as to the possible risks involved in employing such innovative personnel.

The North Carolina act, which represents one of the most concise exceptions providing for the utilization of the physician's assistants, is reproduced in part below:

Section 1. G.S. 90-18 (The Medical Practice Act) is hereby amended by adding a new subdivision to be designated subdivision (14) and to read as follows:

(14) Any act, task or function performed as an assistant to a person licensed as a physician by the Board of Medical Examiners when

- a. such assistant is approved by and annually registered with the Board as one qualified by training or experience to function as an assistant to a physician, except that no more than two assistants may be currently registered for any physician, and
- b. such act, task or function is performed at the direction or under the supervision of such physician, in accordance with rules and regulations promulgated by the Board, and
- c. the services of the assistant are limited to assisting the physician in the particular field or fields for which the assistant has been trained, approved, and registered; provided that this subdivision shall not limit or prevent any physician from delegating to a qualified person any acts, tasks or functions which are otherwise permitted by law or established by custom.

Professional Liability Insurance

The question of professional liability coverage has been investigated extensively. Students in the Duke program are covered by a malpractice policy that insures all employees and students at Duke University. This policy covers students wherever they are receiving instruction. It also covers any vicarious liability risks which an instructor may assume by working with students. Thus, every Duke physician's associate student and physician-instructor, regardless of where he is learning or teaching for a particular course, is covered under Duke University's professional liability coverage.

For graduates of university-based training programs, the Insurance Service Office, formerly The Insurance Rating Board of New York, has established a rating code (Code 9711) for physician's and surgeon's assistants. The purpose of this classification is to enable graduate assistants from any type of university sponsored program to procure liability insurance that covers their activities while they are performing under the responsible supervision of a licensed physician. Similarly, a code (Code 9710H) was established to permit supervising physicians to obtain additional coverage for the added liability they assume in utilizing an assistant. Rates, of course, vary from state to state, but for his independent coverage the assistant pays approximately 50 percent of the rate paid by his supervising physician for similar coverage and the responsible physician generally experiences nominal rate increase for the additional protection necessary to cover his voluntary assumption of increased vicarious liability.

Hospital Utilization

The concept of the physician's associate is based on the premise that at least part of the physician's team should be mobile and able to provide support in any setting in which the physician provides his professional services. Because of the important role hospitals play in most doctors' practices, it was imperative that a

mechanism be developed to incorporate physician's associates into the organizational structure of hospital practice.

The American Hospital Association, The Insurance Service Office and the Joint Commission on Accreditation of Hospitals have been specific in supporting the role of physician's assistants as long as they are administratively and professionally accountable to a physician and not to an institution. In order for a physician's associate to function in a hospital, he must be granted specified clinical privileges under the authority of the medical staff.

Criteria established by the Joint Commission of Accreditation of Hospitals and experience with several hospitals have led to orderly, formalized procedures which can permit a physician to utilize the physician's associate in the hospital.

Securing Privileges. Initially a physician who has employed a physician's associate and desires to use him in a hospital should inform the hospital director of his intentions. The hospital director, upon receipt of the notification, should have the hospital's legal counsel determine what changes, if any, in the charter or by-laws are necessary to allow the medical staff to grant specified privileges to limited practitioners. The general basis for such action is provided under "Interpretation" in Section VII of the *Standards for Accreditation of Hospitals*, published by the Joint Commission on Accreditation of Hospitals. If any charter or by-laws changes are necessary the hospital administration should inform the physician of what changes are necessary and how they can be made.

When the regulations governing the medical staff are compatible with the utilization of limited practitioners the employing or supervising physician should present a dossier to the medical staff committee charged with evaluating credentials that includes: (a) information on the physician's associates background, character, education, and training; (b) a detailed breakdown of the proposed functions and desired privileges for the physician's associate; and (c) the proposed measures of control to be utilized and the limitations to be observed.

Following the final approval of all those concerned with determining the staff functions for the hospital the physician's associate may, under the established guidelines, assist in fulfilling his physician's inpatient responsibilities.

Evaluation Studies

The process of self-evaluation was deemed essential from the program's inception for sound maturation. It was obvious that acceptance by patients, physicians, and other health professionals would be imperative if the concept were to succeed on a practical basis over time.

The initial evaluative effort at Duke was directed toward determining the physician's associates role-set acceptance. From this study it was found that the graduates enjoyed their work and could function equally well in a variety of roles. Nurses and other health workers accepted physician's associates with enthusiasm because the graduates freed them from responsibilities for which they were ill prepared and uncomfortable in performing, thereby enabling them to have time to fulfill those responsibilities for which they had been trained.

Patient Acceptance. The next phase of the Duke studies was predicated on the realization that if patients themselves exhibited any significant reluctance in accepting this type of assistant, further development would be a waste of energy and money. Of the many factors potentially influencing patient acceptance, only



two were found to be statistically significant. First, acceptance was positively and linearly related to the patient's educational attainment. Those with five or less years of formal education were neutral or negative in their response, due, in large part, to their lack of understanding of this new concept. People with a high school education or beyond, however, were very enthusiastic in their response. Investigation of these attitudes revealed an appreciation of both the increased efficiency the physician's associate added to the system and the additional opportunity to communicate with the physician, even though indirectly, about their personal condition.

Second, acceptance as influenced by income was related in a curvilinear fashion, with neutral responses at the extremes but enthusiasm expressed by the vast majority. In few cases did patients express any negative attitudes. However, the added efficiency in terms of time away from work and other responsibilities gained by the physician utilizing a physician's associate seemed to be of less importance to those at either extreme. Subsequent attitudinal investigations have demonstrated an overwhelming positive acceptance of the physician's associate.

Physicians' Acceptance. The third aspect of the acceptance of this concept involved the physician himself. If physicians would not use physician's associates, it would be pointless to educate them. Because physicians had never been exposed to this type of assistant, it would have been difficult for them to evaluate their potential initially. This was one of the primary reasons for not basing the development of the curriculum on a task analysis nor initially seeking physicians' attitudes regarding the capability of this type of assistant to augment their productivity.

In the past five years several polls of physicians' attitudes have been carried out across the country and these have all resulted in a majority support of this concept. Among some groups of physicians over 50 percent indicated a desire to employ some type of physician's assistant if one were available. This positive attitude has been further substantiated by the thousands of employment oppor-

tunities available to Duke graduates and the development of similar programs at several other medical centers.

Productivity. After being initially satisfied that first, assistants of this type felt enjoyment and satisfaction in their career choice; second, other health professionals accepted them in the health care delivery system; third, patients accepted them as a realistic means of improving the delivery of their health services; and fourth, physicians exhibited positive attitudes toward incorporating them into the health care delivery structure, their effect on the productivity of physicians had to be investigated.

In 1969, it was known several months ahead of time: that one graduate had accepted a job with a physician who was the sole provider of medical services in his community, that the physician's practice had leveled off because of his inability to provide care for more people, and that during his almost seven years in practice he had kept meticulous records from which a meaningful practice profile could be extracted. Data collected before and after the graduate joined the physician in his practice disclosed that the incorporation of the physician's associate increased the physician's productivity capability by over 75 percent. Further studies have reconfirmed the value of the physician's associate as well as his ready acceptance on the health care team.

Graduate Opportunities

Physician's associates, because of their comprehensive medical education and their unique professional relationship with the supervising physicians, are able to achieve a functional growth consonant with their ability and desire. The positive response by physicians to this innovative concept has been so overwhelming that graduates of the program have opportunities open to them in virtually every type of practice setting.

Graduates of the program may be employed by a physician, a group of physicians, or an agency. No matter who is providing the financial support, however, *a physician* must assume the responsibility for the physician's associates performance at all times. Outside of the Medical Center there are infinite opportunities for employment with community-based physicians and clinics. In the Duke University Medical Center, graduates are needed in research laboratories and special areas such as the renal center and cardiac care unit. To assist students in the selection of practice settings, requests from potential employers are computer-stored and are readily available to the student. Requests are received almost daily for graduate physician's associates; however, as with requests for physicians, many of these must go unfilled. Prospects for future employment of physician's associates continue to improve with the increasing numbers being trained each year.

At the time of the program's inception, the question of salary range was raised. It was felt then that a professional person of this caliber would command an economically attractive income which in itself would be capable of encouraging career stability. Several other factors supporting a sound economical future have since been realized. First, this new profession represents a career advancement for people already in the health field; second, in order to be most effective physician's associates have to work essentially the same schedule as their physician supervisors; and third, their contribution to a physician's productivity can readily justify a sound income. Although the average starting salary is currently in the range of twelve thousand dollars per year, the ultimate income of a physician's associate will undoubtedly be based on his value to his physician's practice.



2

Program Information

Curriculum Structure and Goals

The professional curriculum of the Physician's Associate Program is twenty-four months in duration and has been developed to provide all students with an indepth understanding of the medical sciences and their application to a clinical discipline. The curriculum includes an academic year devoted to the basic medical sciences coupled with fifteen months of clinical education in a variety of clinical settings. The rigors of the curriculum are designed for people who have had previous education, training, and experience in a health related discipline and who have the desire and capability to assume greater patient care responsibilities.

Students who are able to document previous education in any area and feel that they would not benefit from a particular course are given the opportunity to demonstrate their proficiency by taking an equivalency examination. Any student who passes the examination receives credit for the course and participates in it as a teaching assistant.

Basic Science Curriculum

The basic science curriculum is undertaken during the first two semesters. Because of the relationship of this material with that covered in the clinical rotations, students are required to pass all courses before proceeding on to their clinical work. The section of this *Bulletin* entitled Courses of Instruction provides detailed descriptions of the courses. The basic science curriculum is listed below, preceded by a guide for interpreting course numbers.

Course Number Interpretation. If the very last digit of a course number is *five*, then the course is comprised of two or more subcourses. If the very last digit of a course number is a *zero*, then the course is taught during part or all of both

semesters. If the very last digit of a course number is an *odd* number besides five, then the course is a fall semester course. If the very last digit of a course number is an *even* number, then the course is a spring semester course. All courses numbered under 250 are prerequisite to all courses numbered over 250 for part-time students.

Basic Science Courses

Number	Title	Hours
205	Analysis of Health Systems Development	
205.1	History, Philosophy, and Ethics of Medicine	18 hours
205.3	Community Health and Medicine	12 hours
210	Pharmacology	72 hours
212	Human Growth and Development	70 hours
219	Human Anatomy	60 hours
230	Biochemistry	120 hours
235	Clinical Diagnosis 1	
235.1	Basic Laboratory Procedures	60 hours
235.3	Clinical Chemistry Procedures	30 hours
240	Human Physiology	64 hours
245	Clinical Diagnosis 2	
245.2	Animal Surgery	50 hours
245.4	Electrocardiography	30 hours
255	Objective Medicine	
255.0	Radiology	34 hours
255.2	Microbiology	34 hours
257	Clinical Medicine 1	140 hours
258	Clinical Medicine 2	140 hours
267	Patient Evaluation 1	68 hours
268	Patient Evaluation 2	68 hours
273	Epidemiology	48 hours





Clinical Curriculum

During the second semester of the basic science program students are counseled by the administration to determine the most appropriate clinical program. Because the clinical teaching is carried out in many varied settings students should plan on being away from the Durham area for part of their clinical experience.

In the clinical phase of the curriculum all students are required to complete 16 weeks of clinical experience in general inpatient and outpatient/emergency services. Beyond the required clinical experiences students must complete 44 weeks of elective clinical experience which are tailored to meet each student's specific needs. It is during this phase of the program that the student is expected to develop expertise in the application of his preclinical learning.

The structure of the elective clinical curriculum provides each student with the opportunity of selecting a clinical program that will meet his own desires and needs. Clinical programs are currently available in family practice, internal medicine, pediatrics, surgery, obstetrics and gynecology, psychiatry, radiology, and pathology.



Clinical Schedule

General Inpatient Service	8 weeks	1 course
General Outpatient/Emergency Service	8 weeks	1 course
3 Elective Courses*	8 weeks each	1 course each
3 Elective Courses*	4 weeks each	½ course each
Outside Physician†	8 weeks	1 course
Library Research‡		½ course
Total Clinical Teaching	60 weeks	8 courses

*Selection of electives is determined in accordance with specialty training guidelines.

†This rotation is taken only during the last eight week period.

‡Successful completion of a library research project is required of all students.

Educational Options

Students receive academic credit for all work satisfactorily completed in the Physician's Associate Program. This credit can be presently applied toward certification as well as the Bachelor of Health Science degree.

Certification. Following satisfactory completion of all basic science and clinical courses, the student is required to authenticate his knowledge by satisfactorily completing written and practical examinations conducted prior to graduation. After passing these examinations, the student is certified by the Duke University School of Medicine as a physician's associate. The graduate is eligible at that time for certification by the American Registry of Physicians' Associates and membership in the American Academy of Physicians' Associates. Certification by Duke also qualifies the graduate for certification by North Carolina and other states that require graduation from an approved program before a physician's assistant can work in that state.

Bachelor of Health Science Degree. The Bachelor of Health Science degree was established by Duke University to provide academic recognition for students participating in allied health programs.

In order to meet the requirements for the degree, students must have completed a minimum of 16 courses prior to their matriculation in the Physician's Associate Program. Credit for these courses must be from an accredited college or university. Courses generally are defined as being equivalent to three or more semester credits. For the degree, transferred credit must include at least one course in English, three courses in natural or formal sciences, three courses in social sciences or history and one course in the humanities. As with other undergraduate programs, the student is required to satisfy the physical education requirements in compliance with existing University regulations. A determination of acceptability of transfer credit will be made automatically for all applicants who are selected for an interview. Applicants who want to be considered for the degree must also supply the Committee on Admissions a copy of the bulletin(s) from the institution(s) from which the credit is to be transferred. These bulletins must include descriptions of *all* courses for which transfer credit is desired.

The above requirements comprise the lower division, or the freshman and sophomore years, of the Bachelor of Health Science degree. The upper division requirements, equivalent to the junior and senior years, are fulfilled by successfully completing the fourteen preclinical courses and the general inpatient service and general outpatient/emergency service clinical courses of the Physician's Associate Program. After both lower and upper divisions have been successfully completed the physician's associate student will be granted the Bachelor of Health Science degree by Duke University.

It should be noted that the successful completion of the Bachelor of Health Science degree *does not* coincide with the completion of the Physician's Associate Program. The student who earns the degree will still have eight clinical course requirements as well as written and practical examinations to complete before being certified as a physician's associate by the Medical School.



3

Admission

Prerequisites

Students are admitted only at the beginning of the academic school year in the fall. Since enrollment is limited, the Committee on Admissions selects those who are best qualified to benefit from the program. Selection is based on the academic record of the candidate, test scores, assessment of previous health related achievements, and satisfactory evidence of good character and general fitness.

Applicants are considered without regard to race, color, religion, sex, or national origin. Because of the academic demands on the student during the program, certain prerequisites have been established for qualification as a candidate for admission.

The prerequisites for admission into the professional curriculum include:

A High School Diploma or Its Equivalent. Preference is given to candidates with two or more years of successfully completed general college course work.

Previous Experience in the Health Field. This experience must include at least 2,000 hours involving direct patient contact. Experience gained as a medical corpsman, radiologic technician, registered nurse, licensed practical nurse, surgical technician, medical technologist, physical therapist, inhalation therapist, etc. all fulfill this requirement.

Three Character References and Personal Evaluations. One evaluation must be from a physician with whom the applicant has worked, one from the applicant's current supervisor, and one from an unrelated acquaintance of five years or more.



Completion of the Scholastic Aptitude Test (Verbal and Math Portions). These tests will be given on July 8, 1972; November 4, 1972; December 2, 1972; January 13, 1973; and March 3, 1973. Thirty-one days before the test date is usually the last date for registering for the test without being charged a penalty fee. The closing dates for final registration are generally 14 days before the test.

Arrangements for taking these tests can be made through the Educational Testing Service. Applicants from the west, southwest, and all foreign countries should address their correspondence to: The College Entrance Examination Board, P.O. Box 1025, Berkeley, California 94701. Applicants from the east, midwest, and south should address their correspondence to: The College Entrance Examination Board, P.O. Box 592, Princeton, New Jersey 08540.

Information can also be obtained through local high schools, military educational offices, and local Educational Testing Service offices in many cities. When registering for the examinations, the student will have to provide the code number of the college that is to receive the test results. The code number for the Duke University Physician's Associate Program is 5174. Remember to take that number with you when you register for the examination.

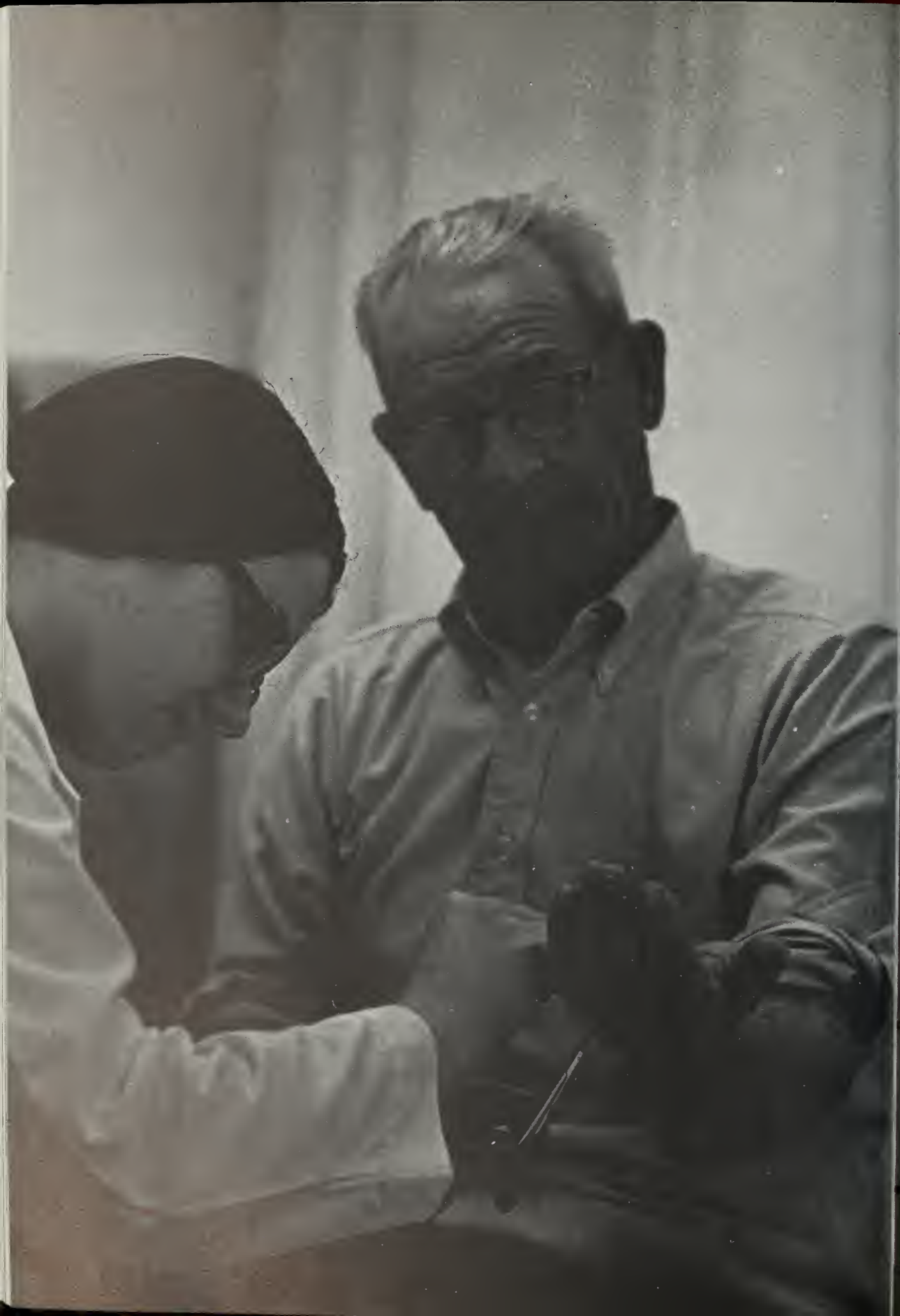
Test scores more than five years old are generally not considered valid indicators of a student's current ability to perform at the college level. Because of this, unless a substantial portion of the interim has been devoted to academic achievements, students are encouraged to submit current examination results.

The Physician's Associate Program does *not* accept scores from any other similar test in lieu of the Scholastic Aptitude Tests of the College Entrance Examination Board.

Procedures

Application Completion Data. Application files must be complete by April 1 (except for tests taken in March) of the year for which admission is requested. To be considered complete, the candidate's file must contain the following: (a) a completed application form with photograph; (b) transcript records from high school, college, military schools, and of all other academic education; (c) the three completed personal evaluation forms; (d) Scholastic Aptitude Test results; and (e) record of payment of the \$10.00 application fee.

Selection Procedures. The data on each candidate are carefully screened by the Committee on Admissions and selected candidates are invited to Duke University for personal interviews. Interviews will be held during the months of April and May, with final notification on admission given by June 1.



4

Registration and Regulations

Registration and Orientation

Students are registered promptly at 9 a.m. on the first day of classes. A late fee of \$10 is required of students who do not register at the designated time. Orientation immediately follows registration and lasts the remainder of the first week. During orientation, each student is required to undergo a physical examination under the program's direction. Students whose conditions require further observation may temporarily begin the program, but will be dropped if findings prove them physically unable to continue. Classes begin the following week.

Identification Cards

Each student is issued an identification card which is to be carried at all times. The card secures library privileges, health services, entry into certain athletic events, and admission to other functions open to those with Duke student status. The student is expected to present the card at the request of any authorized official of the University.

Identification cards are not transferable and their loss should be reported immediately to the Program Director's Office. The cost of a new identification card is \$5.

Academic Regulations

Grades. Final grades of performance in academic work are sent to students at the end of both semesters of the basic science year and after each clinical rotation. Students are notified immediately of any unsatisfactory performance. Progress

through each phase of the program is monitored by the faculty in charge.

Student evaluations are based on the student's conduct, performance and written and oral examinations. Grades reflect the quality of the student's daily work, examinations, attendance, attitude, appearance, and interest.

Passing grades are *A*, exceptional; *B*, superior; and *C*, satisfactory. A passing grade may be modified by a plus or a minus to allow the student to have a more precise definition of the quality of work. Pluses and minuses, however are not recorded on student records. *F* is a failing grade that may not be made up except by repeating the course. All failures in the basic science portion must be made up before the student is eligible to participate in clinical rotations.

If, because of illness or other emergency, a student's work in a course is incomplete he may receive an *I* for the course instead of a final grade. Incomplete courses must be completed before the close of the succeeding semester; otherwise, the *I* is converted to an *F* and the course must be retaken before the student can receive any credit for it.

Attendance. Class attendance regulations specifically place the responsibility upon the individual student. A student is expected to attend his classes regularly and punctually. The student should recognize that one of the most vital aspects of his college experience is attendance in the classroom, and that the value of this academic experience cannot be fully measured by testing procedures alone. The members of the student body are considered sufficiently mature to appreciate the necessity of regular attendance, to have the self-discipline essential for such performance and to recognize and accept the consequences of failure to attend. Instructors are privileged to refer any student to the Program Director for appropriate action who, in their opinion, is causing his work or that of the class to suffer because of absence or tardiness.

Absence from class due to illness will be excused only when certified by a proper medical official. Absence from class due to authorized representation of



the University may also be excused. Officials in charge of groups representing the University are required to submit the name of each person to be excused to the Program Director's office forty-eight hours in advance of the hour when the absence is to commence.

Non-Academic Regulations

All candidates who accept admission to the program obligate themselves to comply with all regulations established by the University, the Medical School, and the Physician's Associate Program. The rights and responsibilities of the student and University-wide regulations pertaining to student conduct are incorporated in the *Bulletin of Information and Regulations* which is issued to the student at the time of registration or is available upon request after the offer of admission is made. Regulations pertaining to the use and parking of motor vehicles, possession and use of alcoholic beverages, and possession and use of certain drugs are covered in detail.

In addition to University regulations, students in the Physician's Associate Program must comply with standards governing attendance, dress, appearance, and professional conduct that have been established to safeguard the privacy, rights, and comfort of patients and to promote and protect the image of the profession.

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5

Resources for Study

Libraries

The Perkins Library, among the finest university libraries in the country, contains over 2,231,000 volumes and 4,200,000 manuscripts. About 100,000 volumes are added annually. Separate departmental and professional school libraries provide notable collections in the several disciplines. More detailed information may be obtained in a *Student's Guide to the General Library*, available upon request from the Librarian of the University.

The Medical Center Library, located in the Davison Building, attempts to provide all services and collections necessary to further educational, research, and clinical activities in the medical field. Extensive reference and bibliographical services are provided. The collection exceeds 17,000 volumes; 1,750 periodicals are also currently received. The Trent Collection on historical medicine is an unusually fine collection of manuscripts and rare books and provides an opportunity for study, research, and casual reading.

Students enrolled in the Physician's Associate Program are eligible to use the services of the library in the Durham Veterans Administration Hospital which contains a wide selection of medical references and an extensive collection of periodicals.

Hospitals and Clinical Facilities

Duke Hospital. Duke Hospital is an 800-bed hospital performing the dual functions of professional education and patient care. Comprehensive diagnostic and treatment facilities are provided at various levels of patient care ranging from

the intensive care units to the conventional treatment sections and minimal care units. Private, semiprivate, and ward accommodations are utilized by the more than 23,000 patients admitted each year.

The approximate daily census of the hospital by service is: Surgery, including the surgical subspecialties, 310; Medicine, 205; Pediatrics, 55; Psychiatry, 50; and Obstetrics-Gynecology, 50. Surgical facilities include 18 operating rooms where over 15,000 surgical procedures are performed annually. Four obstetrical delivery rooms are maintained as well as special diagnostic and treatment units such as the recovery room, cardiac catheterization laboratory, hemodialysis laboratory, and hyperbaric oxygenation chamber.

The outpatient services include the public clinics, private clinics, health clinics, and the emergency service. Over 250,000 visits are made each year to these units. Duke Hospital also maintains a close working relationship with outside health agencies, further enhancing continued patient care.

The clinical faculty of the Duke University School of Medicine forms the medical staff of Duke Hospital. This group participates both in undergraduate and graduate medical education and in active medical practice within the hospital and the private diagnostic clinics. Duke Hospital is approved for internship and residency training by the Council on Medical Education of the American Medical Association and conducts an active educational program involving approximately 340 house staff members. The hospital is fully accredited by the Joint Committee on Accreditation of Hospitals.

The VA Hospital. The Durham Veterans Administration Hospital is located within walking distance of the School of Medicine. All full-time professional staff members of the Veterans Administration Hospital are also members of the faculty of Duke University School of Medicine. The VA, a 489-bed general hospital, provides the Duke Medical Center with an excellent opportunity for closely integrated student teaching and house staff training.





Other Hospitals. Additional outpatient and inpatient hospital facilities utilized for clinical training include the Oteen Veterans Hospital, Asheville, North Carolina; the Highland Hospital, Asheville, North Carolina; Sea Level Hospital, Sea Level, North Carolina; Doctor's Hospital, Washington, D. C.; and the Student Health Services at the University of Florida, Gainesville, Florida.

Classroom Facilities

A new 17,000 square foot, two story Allied Health Sciences Building was opened in 1971 on the Durham Veterans Administration Hospital campus. This fully air conditioned facility includes modern classrooms and laboratories as well as a large and attractive student lounge and several areas for student study.

Classroom facilities for students are also available on or near the respective clinical teaching wards.



6

Student Life

Living Accommodations

All students enrolled in the Physician's Associate Program are responsible for making arrangements for their own off-campus housing; they are not eligible for undergraduate dormitory accommodations. Suitable quarters can be rented in areas near the Medical Center.

Information, including rental rates, concerning off-campus housing facilities for students enrolled in the program is provided on request by the Department of Housing Management, Duke University, Durham, North Carolina 27706.

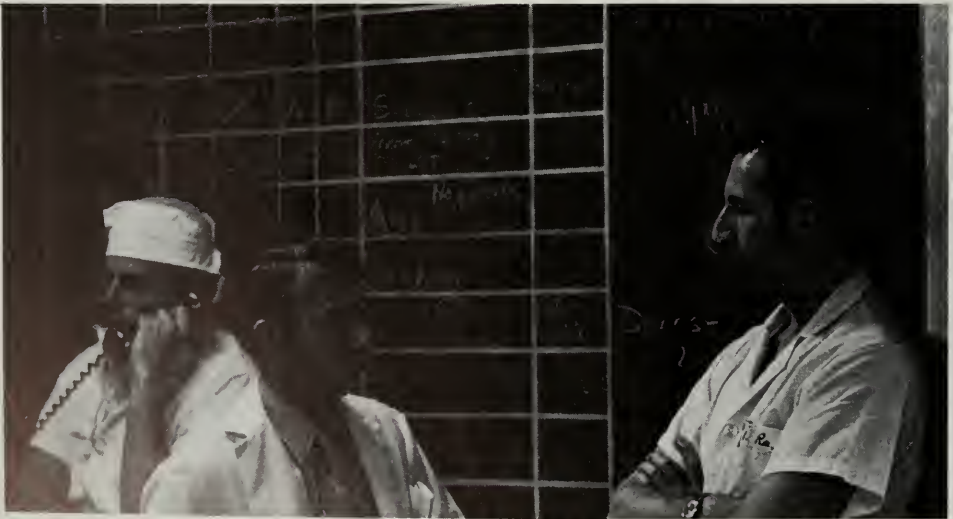
Dining Facilities

Several dining facilities located in and near the Medical Center are available to the students. In the Duke University Union Building, there are two cafeterias offering multiple-choice menus and a dining room, The Oak Room, which offers full menus and a la carte items.

Duke Hospital offers a cafeteria service with multiple-choice menus for professional students and employees. There are also cafeterias in the Graduate Center and the Veterans Hospital.

Student Health Services

Students are treated as outpatients at the University Health Clinic six days a week from 8 a.m. to 10 p.m. and on Sunday from 2 p.m. to 10 p.m.; emergency service is available at all other times in the Emergency Room. Students are en-



couraged to take advantage of the opportunity to obtain health coverage through the North Carolina Blue Cross & Blue Shield Association that is available at reduced rates to students and employees of the University and Medical Center. At the beginning of the first year students are given a complete physical examination, including an x-ray examination of the chest and various laboratory studies; thereafter physical examinations are performed annually, as long as the student is enrolled.

The Student Organization

The Stead Society is a professional organization open to physician's associate students. As the Stead Society is the Duke chapter of the student organization of the American Academy of Physicians' Associates, participation in the group is on a voluntary basis. The aims of the Society are the promotion of scholarship, the encouragement of high standards of character and conduct among students and graduates, and the recognition of scholastic achievement within the clinical setting. The Society also assumes the responsibilities of freshmen orientation and the organization of extracurricular educational and social events. As part of freshmen orientation the Stead Society manages a "big brother" program to acquaint incoming students with the Durham area, the school and to assist them in securing living quarters.

Outstanding Student Award

The John Richard Scheele award was founded by his friends following his death on August 4, 1970. Scheele graduated in 1967 with the highest class standing in the first class of students. Following his graduation he dedicated his life to furthering the recognition of the physician's associate as a unique, valuable, and integral component of the health care team.

The Scheele award is given annually to that member of the graduating class who, through outstanding scholarship and clinical achievement, best exemplifies the ideals and standard of the professional physician's associate.



7

Financial Information

Tuition and Fees

Tuition. In order to defray the high cost of the educational experience students at Duke University are obligated to pay \$2,500 tuition for the 1972-73 academic year. The tuition is projected at \$2,700 for the 1973-74 academic year. No one admitted to the Physician's Associate Program will be denied the opportunity to participate in the program because of an inability to pay tuition. Every matriculating student will have the option of postponing tuition payment until after graduation. This option is made possible by the deferred tuition plan, which allows graduates to have up to ten years to repay their tuition. Under this plan every potential student will be able financially to afford to enroll, since every graduate can anticipate a sound financial future.

Furthermore, the prospective student who seeks the optimum opportunity in higher education will not be, and in this case need not be, a bargain hunter. No college or university program claims that an education at the college level is inexpensive. However, most university people and the ever-growing number of alumni families across the country will express the belief that the benefits derived from higher education constitute a handsome return on the dollars invested.

Fees paid by the students cover only a fraction of the costs of their instruction and the operations of the institution. Support from other sources is used to defray the balance of the expenses. Information on tuition rates for part-time students is available upon request.

Estimated Expenses for an Academic Year. Certain basic expenditures are to be considered in preparing a student's budget such as tuition, room, and board.

These necessary expenditures together with a reasonable amount allotted for miscellaneous items such as books and supplies are shown below:

Tuition	\$2,500
Room—single	800
Room—married	1,600
Board—per person	780
Books	160
Equipment	190
Uniforms	70

It should be realized that additional expenses will be incurred which will depend, to a large extent, upon the tastes and habits of the individual. It is realistic to suggest that the average student, however, can plan on a budget of \$1,600 per year beyond tuition. Travel costs, clothing purchases, and other major expenditures would have to be added to this estimate.

Application. Each student is required to submit a non-refundable \$10 application fee to cover the cost of processing.

Late Fee. A late registration fee of \$10 is required of students who do not register at the designated time.

Debts. No records are released and no student is considered by the administration as a candidate for graduation until all accounts for indebtedness have been settled with the Bursar.



Student Aid

Deferred Tuition Plan. The purpose of the deferred tuition plan is to enable students to defer the major cost of their education, the tuition, until they are earning income. All full-time students seeking certification as a physician's associate are eligible borrowers under this plan. Any student may borrow up to 100 percent of the tuition charges; and there is no minimum.

The amount of indebtedness is calculated on the loan plus eight percent interest on the unpaid balance. Options open to the graduating student for discharging their obligation range from a lump sum repayment within 90 days to monthly payments varying from one to ten years.

Monthly payments begin three months after a borrower ceases to be a candidate for certification as a physician's associate at the Duke program. For most students, this will be three months following their graduation and employment.

Any borrower may make supplemental payments to apply toward the ordinary next payment due or toward optional total prepayment.

Other Financial Assistance. The Physician's Associate Program, as a bona fide university program, is approved for veterans' educational benefits (G. I. Bill) for those who are eligible.

Limited funds for defraying living expenses may also be available. These funds are distributed by the program on the basis of need. Application for assistance for personal support is considered only after registration and students should not anticipate the availability of financial assistance as a means of subsistence.

Student Employment Opportunities. Part-time employment for students is available in many areas of the Medical Center. Employment that can frequently net students about \$100 per month and not jeopardize their education is generally available. Students must comply with the academic schedule and are prohibited from working more than fifteen hours per week.

Employment for students' spouses is available at or near the University. Typical salaries are three to five hundred dollars per month for secretaries, practical nurses, and other technically trained people; and four to seven hundred dollars per month for registered nurses, medical technologists, and other professionally trained people.



8

Courses of Instruction

Basic Science Courses

The basic science curriculum is designed to develop an understanding of the theoretical concepts of disease processes in the shortest possible time. Students are required to satisfactorily complete all basic science courses before beginning the clinical curriculum. Further information, such as prerequisites, semesters taught and total hours for each course may be found on pages 11-12.

205. Analysis of Health Systems Development. This course is composed of subcourses. *205.1 History, Philosophy and Ethics of Medicine* and *205.3 Community Health and Medicine*. The former subcourse is taught as a seminar and group discussion for the purpose of understanding current medical policies and ethics through a study of their development and their application to the health team structure. The latter subcourse, also taught as a seminar and group discussion, develops an appreciation of the many people and organizations involved in delivering comprehensive health services to a community through governmental and voluntary health agencies. One course.

210. Pharmacology. A lecture-seminar course developed to acquaint the student with chemotherapeutic agents and their chemical functions within the human body and specific organ systems. Chemotherapeutic agents are classified and studied in groups with the emphasis placed on understanding the functions and characteristics of commonly used prescription drugs. One course.

212. Human Growth and Development. A lecture and discussion course designed to acquaint the student with the normal and abnormal development of physical and behavioral characteristics as they relate to the human. The effects and consequences of congenital and environmental influences are studied in relation to the pediatric, adult and geriatric patient. One course.

219. Human Anatomy. A lecture-laboratory course that examines human structure and function and the anatomic relationships of the skin, head, neck, eyes, ears, nose, throat and the cardiovascular, respiratory, endocrinologic, gastrointestinal, renal, reproductive, musculoskeletal, and neurologic systems. The course includes laboratory exercises for the purpose of performing and observing dissection of the human body. One course.

230. Biochemistry. A lecture and discussion course beginning with an introduction to the basics of biological chemistry for the purpose of understanding the chemical functions of the body and its various organ systems. During the course the important chemical functions of each organ system are studied in detail as are their impact on other organ systems. One course.

235. Clinical Diagnosis I. This course is composed of subcourses *235.1 Basic Laboratory Procedures* and *235.3 Clinical Chemistry Procedures*. Both subcourses are lecture-laboratory courses. Clinical Chemistry Procedures is concerned with common chemical procedures employed in the evaluation of disease processes while Basic Laboratory Procedures develops skills for performing routine hematologic and urinary analytic procedures. One course.

240. Human Physiology. A lecture-demonstration course studying human structure and function beginning with the cell and progressing through the physiologic relationships of the skin, head, neck, eyes, ears, nose, throat and the cardiovascular, respiratory, endocrinologic, gastrointestinal, renal, reproductive, musculoskeletal, and neurologic systems. One course.

245. Clinical Diagnosis II. Subcourse *245.2 Animal Surgery* is a lecture-laboratory course that entails carrying out common surgical procedures on laboratory animals (dogs). The other half of this course, subcourse *245.4 Electrocardiography* is a lecture-demonstration course that emphasizes the interpretation of electrocardiographic tracings. One course.

255. Objective Medicine. This lecture-demonstration course, composed of two subcourses, includes instruction in clinical radiology (subcourse *255.0 Radiology*) as well as the basic elements and common applications of microbiology (subcourse *255.2 Microbiology*). One course.

257. Clinical Medicine I. A lecture-demonstration-discussion course providing a detailed study of the natural history of disease processes, aberration of normal physiology caused by disease and the methods of restoring normal body functions. Concentration is on those disease processes associated with the skin, eyes, ears, nose, throat, neck and the respiratory and cardiovascular systems. One course.

258. Clinical Medicine II. A continuation of 257, this course covers the diseases associated with the endocrinologic, gastroenterologic, renal, reproductive, hematopoietic, neurologic and musculoskeletal systems. One course.

267. Patient Evaluation I. A lecture-seminar-discussion course with extensive clinical exposure that introduces the student to techniques used in eliciting patient histories and performing physical examinations. This portion of a two semester course includes detailed instruction in the elicitation and proper recording of subjective data including the chief complaint, history of the present illness, systemic review, past medical history, social history, and family history. Instruction is formulated toward the problem-oriented approach of recording data from the patient interview. One course.

268. Patient Evaluation II. A lecture-seminar-discussion course with extensive clinical exposure that teaches techniques and procedures used in the collection of objective data through the physical examination of patients. Students are expected to integrate the physical findings with data collected in the historical interview in such a way that the supervising physician can readily determine the next appropriate diagnostic or therapeutic step. Successful completion of the course includes development of an ability to accurately detect and record all physical signs and findings, integrate these with historical data, and put in writing all historical and physical findings in such a way that when countersigned by the physician, they will be acceptable as part of the patient's permanent medical record. One course.

273. Epidemiology. A lecture and discussion course introducing basic concepts of epidemiology and the application of epidemiologic principles to cardiovascular, metabolic and malignant diseases. One course.

Clinical Courses

After the successful completion of the basic science courses instruction moves to the clinical setting. In the clinical setting the student develops an understanding of the application of the basic science curriculum to the needs of the patient. The student also builds the foundation for assuming future decision-making responsibilities through this curriculum.

All schedules for the clinical experience are developed individually, varying with the needs and desires of the particular student. Personal counseling and detailed descriptions of each rotation help the students arrange their schedules to their satisfaction.

REQUIRED CLINICAL ROTATIONS.

The three clinical courses—300, 301, 302—that provide the necessary scope of clinical understanding essential for a strong generalist education are required for all students. Every student is also required to complete a library research project—303.

300. Inpatient Service. An eight-week full-time required clinical rotation in which the student learns to apply his basic medical knowledge to the problems and situations encountered on an inpatient service. Through historical review, physical examination, and participation in daily rounds and managing patient problems, the student develops an awareness and understanding of the multiple aspects of disease processes and becomes familiar with therapeutic regimen and dispositions relative to specific disease states. When the patient is ready for discharge, the student compiles and records a narrative summary for inclusion in the patient's medical record. One course.

301. Outpatient/Emergency Service. An eight-week full-time required clinical rotation in which the student learns to apply his basic medical knowledge to the common problems and situations encountered on an outpatient/emergency service through exposure to a broad spectrum of pathology. The student assists the staff by taking histories, completing physical examinations, initiating emergency care consistent with triage findings reviewed by the resident staff, performing routine diagnostic laboratory studies and arranging for and tabulating data from other

diagnostic studies. The student is provided with an opportunity to become acquainted with the influencing factors of common and emergent illness and acquires a working knowledge of procedures required in life-threatening emergencies. This course is required for all students. One course.

302. Outside Physician. An eight-week clinical experience in association with a community-based practitioner to acquaint the student with those aspects of the practice of medicine unique to the community setting. In this rotation, which is taken during the last two months of the program, the student works with the physician in the hospital, the office and all other areas where the physician works. In the hospital the student makes rounds with the physician and assists him in fulfilling his inpatient responsibilities. In the office the student learns about management procedures in a private practice and helps the physician by providing services consonant with his individual background and clinical training. This course is required for all students. One course.

303. Library Research. During the clinical portion of the program a library research paper is completed as a means of demonstrating the student's ability to locate information and develop an indepth analysis of an approved topic. The paper is written for presentation at a medical seminar. The rough-draft undergoes screening for sentence structure, grammar and composition prior to being sent on to physicians who review the content for its medical validity. The paper in its final form is judged by a panel of physicians from the faculty. This course is required for all students. Half-course.

ELECTIVE CLINICAL ROTATIONS

The remaining clinical rotations provide the student with an opportunity to develop a degree of expertise in a selected clinical discipline. Some of the "elective" clinical courses may be required, depending on the clinical major selected.

Medicine

309. Intensive Care Service. A four-week rotation that acquaints the student with the acute and intensive care required for patients who have undergone major and complex surgical procedures, suffered massive and severe trauma involving multiple organ systems or experienced sudden complicating cardiorespiratory collapse or other life threatening medical crises. Emphasis is placed on ventilatory assistance, cardiopulmonary resuscitation, fluid and electrolyte replacement and acid-base balance under resident physician supervision. Exposure to complex and life threatening patient problems allows the student to develop an understanding of the pathophysiology, physiology and reasoning associated with making major clinical decisions. This course is required for all students majoring in medicine and surgery. Half-course.

310. Health Clinic Service. A four-week rotation familiarizing the student with various clinic populations served by the Department of Community Health Sciences. The student develops and applies the knowledge and skills necessary for patient evaluation under the direct supervision of a physician and becomes acquainted with problems encountered by specific community groups. In addition to routine evaluations of well patients, the student is exposed to a broad spectrum of acute diseases and injuries and participates in the triage and appropriate referral of patients requiring consultation. This course is required for all students majoring in medicine. Half-course.

311. Allergy and Respiratory Disease. An eight-week rotation that provides an in-depth exposure to patients with respiratory and allergic conditions. The problems encountered by patients who have respiratory ailments are studied in detail as are the associated special history and physical examination techniques and diagnostic and therapeutic procedures (including allergy skin testing and eosinophilic nasal smear counts). The student participates in daily rounds and teaching conferences on respiratory diseases and gains a knowledge of the therapeutic regimen, their indications, availability, reliability, and limitations in the treatment of respiratory and allergic diseases. One course.

312. Cardiology. An eight-week rotation during which the indications, limitations and methods of performing the necessary diagnostic procedures and therapeutic regimen for the evaluation of disorders of the cardiovascular systems are studied. Students conduct initial patient evaluations including the history and physical examination, and perform relevant diagnostic and therapeutic studies including the interpretation of electrocardiographic and phonocardiogram studies. Students follow patients from admission to discharge, attend all daily rounds and conferences, assist in the provision of patient care, record progress notes, perform discharge physical examinations and write narrative summaries under the guidance of the physician-in-charge. One course.

313. Cardiovascular Laboratory. An eight-week rotation during which the indications, limitations, and methods of cardiac catheterization and other cardiovascular diagnostic studies are analyzed. In addition to attending daily rounds and conferences, the student becomes acquainted with cardiovascular electronic and laboratory equipment and learns to utilize this equipment with competence and skill. The student participates in catheterization procedures, performs cardiac catheterizations on laboratory animals, carries out complete evaluations on clinic patients in order to develop a knowledge of cardiac diseases and the diagnostic role of cardiac catheterization, participates in the management of cardiac patients in the post-operative state and provides treatment for patients with procedural complications. Students follow patients from admission to discharge to become acquainted with the dispositions for patients with cardiovascular diseases. One course.

314. Endocrinology. An eight-week rotation designed to acquaint the student with endocrinological diseases with emphasis placed on the diagnosis and treatment of these diseases. Students attend all daily rounds and conferences while on the service. They are taught the indications, limitations, and methods of performing diagnostic procedures including: glucose, insulin, and tolbutamide tolerance testing; thyroid function studies; and nasogastric intubation and gastric analytic studies. The evaluation and care for endocrinologic patients is part of this rotation, as is being regularly involved with patient history and physical examinations and composing narrative summaries under physician supervision. One course.

315. Gastroenterology. An eight-week rotation providing in-depth exposure to gastroenterology with emphasis on diagnostic and treatment of gastroenterologic conditions. The student attends all conferences and daily rounds provided by the service, develops expertise in taking histories and performing physical examinations and carries out diagnostic and therapeutic procedures. Participating in inpatient care and recording progress notes on assigned patients are important in this rotation as well as becoming proficient at performing nasogastric intubations and gastric analyses (both with and without fluoroscopy), secretin tests, rectal and small bowel biopsies, proctoscopies, sigmoidoscopies, and gastroscopies. A proficiency in the

care of endoscopic and biopsy instruments and biopsy specimens is taught. The student follows patients from admission to discharge and completes the discharge physical examination and narrative summaries subject to physician approval. One course.

316. Hematology. An eight-week rotation surveying the spectrum of hematologic disorders. The student is required to attend all daily rounds and conferences while on the hematology service. By special history and physical examination techniques, the student learns the indications, limitations, and methods of performing the necessary diagnostic and therapeutic procedures for treating these disorders. The rotation offers: a thorough understanding of performing and screening routine blood work, blood cultures, bone marrow biopsies and serum electrophoresis; and the development of skill in carrying out paracenteses, thoracenteses, blood transfusions, and the intravenous infusion of chemotherapeutic agents. Scheduling procedures in x-ray and nuclear medicine, collecting data from diagnostic laboratories, organizing ward charts and developing techniques in expediting patient studies are also required during this rotation. One course.

317. Hyperbaric Medicine. An eight-week rotation providing an understanding of the importance and relationship of detailed patient work-ups specifically related to patients requiring the services of the hyperbaric chamber. The indications, limitations, and scope of hyperbaric services; an understanding of the proper use of the hyperbaric chamber; and the progress of patients under and/or following hyperbaric therapy, including pre- and post-treatment rounds, are covered in this course. One course.

318. General Medicine. An eight-week general combined service rotation during which the indications, limitations, and methods of performing the necessary diagnostic procedures and therapeutic measures used in the treatment of general medical disorders are reviewed. Patient problems and conditions as experienced in the outpatient clinic, the emergency room, and the hospital ward are covered in this course. The student, through the collection and acquisition of historical, physical, and laboratory data, develops an understanding of patient evaluation and treatment under physician supervision. One course.

319. Nephrology. An eight-week rotation that acquaints the student with nephrologic disorders with the emphasis on diagnosis and treatment of chronic renal diseases. Attendance at all daily rounds and conferences is required. The indications for, and the limitations and methods of performing renal biopsies are studied. The student is exposed to a spectrum of acute and chronic renal diseases and develops an understanding of patient problems through initial patient evaluations and participation in the progress and evaluation of patients on the nephrology service. During the rotation the indications for and procedures and equipment involved in renal dialysis are covered in detail. One course.

320. Neurology. An eight-week rotation dealing with neurological problems through the inpatient and outpatient care and evaluation of neurologic patients including specialized history and physical techniques used in diagnosing neurologic diseases. Performing diagnostic and therapeutic procedures including lumbar punctures, tolerance testings, intravenous infusion of medications, complete blood counts, spinal fluid analyses, and blood cultures are part of this course. Scheduling procedures carried out in radiology, nuclear medicine, and the electroencephalographic laboratory, and assisting in the expedition of patient studies are required during training. The student develops an understanding of neurologic

procedures, including electroencephalography, brain scan studies, pneumoencephalography, and central nervous system radiologic dye studies. Discharge physical examinations and recording narrative summaries to ensure chart completion are carried out as directed. The student is required to attend all daily public and private teaching rounds and neurological conferences. One course.

322. Rheumatology. An eight-week rotation that provides an indepth exposure to rheumatologic diseases by learning therapeutic techniques specifically related to rheumatology patients, learning to carry out detailed specialized patient evaluations, learning the handling and care of necessary specimens and equipment, and developing competence in performing diagnostic procedures required in the evaluation and treatment of rheumatologic patients. The scope of the course includes the therapeutic regimen, their indications, availability, reliability, and limitations in the treatment of rheumatologic diseases. The student is required to follow patients from admission to discharge in order to become acquainted with the spectrum of potential dispositions. Attendance at daily rounds and teaching conferences conducted by the service are required. One course.

323. Dermatology. A four-week rotation reviewing the spectrum of dermatologic diseases encountered by both inpatients and outpatients. Taking histories and performing physical examinations with special emphasis on problems concerning dermatologic diseases as well as carrying out potassium hydroxide preparations, skin biopsies, and tissue scrapings on prescribed patients are included in this rotation. The student becomes familiar with the diagnostic procedures and therapeutic regimen, their indications, availability, reliability, and limitations in the treatment of dermatologic diseases. This course requires following patients from admission to discharge, becoming acquainted with the possible dispositions of the dermatologic patient, and attending all daily rounds and conferences required by the service. Half-course.

324. Family Practice. An eight-week clinical experience surveying the components of family practice, including emotional conflicts and interpersonal relationships with the patient and other members of the family unit. Through experience in interviewing and examining patients, the student is exposed to the multifaceted approach of understanding and treating physiologic and sociologic components of disease processes. In this situation, an understanding of the common diseases treated by primary care practitioners and the aspects of the unique relationship a physician's associate experiences with private patients, their physician, and other health team members may be developed. One course.

325. Environmental Health. A four-week rotation covering the basic principles of environmental health, including industrial toxicology, workmen's compensation laws, and labor and industrial relations. This instruction is supplemented by extensive readings in related areas. Half-course.

326. Industrial Hygiene Laboratory. An eight-week rotation teaching methods of air sampling and analysis, and analysis of blood and urine for heavy metals and other toxic agents. A knowledge, understanding and proficiency in the use of these methods is developed by their practical application in both laboratory and industrial settings. One course.

327. Industrial Hygiene Survey Methods. An eight-week rotation that provides an understanding of the evaluation of occupational hazards including chemicals, light, noise, dust, radiation, gases and other harmful agents. The student is taught the care and use of field survey instruments, the application of findings

to epidemiological studies, and general principles of institutional sanitation. One course.

328. Public Health and Environmental Hygiene. A four-week rotation oriented to the operations of city, state, federal, and voluntary health agencies on their functions in epidemiology and environmental hygiene. Participation in the activities of current operational community projects under sponsorship of the School of Medicine and familiarization with the academic and research facilities, as well as programs being carried out at regional institutions, is part of this course. Half-course.

399. Independent Study. An eight-week special course for students, who, because of their personal background or career desires, are unable to select a clinical curriculum from established courses that will meet their needs. On an individual basis, the student and the program administrators will select a series of mutually agreed objectives and develop a curriculum that can be reasonably expected to achieve those objectives. One course.

Surgery

412. General Surgery. An eight-week rotation that studies a variety of acute surgical problems. An understanding of patient care through the evaluation and management of patients is developed. Under supervision, the student is expected to use initiative to carry out preoperative and postoperative patient care including taking histories, performing physical examinations, assisting in the emergency and operating rooms, and participating in classroom learning. Attendance at all rounds and teaching conferences provided by the service is required. One course.

413. Neurosurgery. An eight-week experience covering neurological diseases and methods of neurosurgical therapeutic intervention. The student takes histories, performs physical examinations, and does numerous related laboratory studies, assists in the operating room and helps with special diagnostic and therapeutic procedures. Understanding the care and use of neurosurgical instruments and photographic and electronic equipment is also required. Participation in stereotactic research studies is required of the student as is attendance on all rounds and teaching conferences. One course.

414. Ophthalmology. An eight-week rotation reviewing the major ophthalmologic diseases. Through lectures, teaching rounds and learning special history and physical examination techniques, the student develops an expertise at determining visual fields, visual acuity, and oculotometry. The principles of refraction and the many medical and surgical therapeutic regimen available for treating ophthalmologic disorders are included. In addition, the student is required to participate in the routine care of ophthalmologic inpatients and outpatients. One course.

415. Orthopaedic Surgery. An eight-week rotation surveying the knowledge necessary for understanding the many problems of the orthopedic patient. This experience includes learning specialized orthopedic historical review and physical examination techniques, delivering emergency care to patients suffering from acute trauma, caring for the pre- and post-operative orthopedic patients and maintaining sterile operating room techniques. An understanding of the pathophysiology and the complications of bone and joint injury as well as the ability to fabricate and apply a variety of splints, tractions, and casts is taught. One course.

416. Otolaryngology. An eight-week clinical experience studying common otolaryngologic diseases. The student develops an understanding of emergency problems and how to initiate the first steps in the management of such problems. Evaluation of the otorhinolaryngologic patient by appropriate history and physical examination, following the course of disease processes and evaluating the response to treatment by the physician are required. Learning and performing tracheostomy care, assisting with the management of the pre- and post-operative patients, assisting in the operating room, and learning to perform specialized audiometric tests are also required. One course.

417. Urology. An eight-week rotation that studies urologic disease processes. Performing history and physical examinations on clinic and hospitalized patients is included. Participation in all clinical rounds and teaching conferences is required to develop an understanding of the therapeutic regimen, their indications, availability, reliability, and limitations in the treatment of urologic disorders. The student develops an understanding of urologic disorders and the indications for catheterization, cystoscopy, renal function studies, intravenous pyelograms, and urine chemical evaluations. Participation in the pre- and post-operative care of the urologic patient, performing discharge physical examinations and writing narrative summaries for assigned patients is part of the course. One course.

418. Plastic Surgery. An eight-week experience studying maxillofacial cancer patients and patients with facial anomalies. There is extensive exposure to patients with burns of electrical, chemical and thermal origin. The course objectives include an understanding of the preoperative and postoperative care of plastic surgical patients, recording the preoperative history and physical examination, performing indicated laboratory tests, and scheduling associated studies. Monitoring the postoperative development and assisting in the care of the post-operative patient in the plastic dressing room is required. The student develops a working understanding of fluid and electrolyte balance and administers intravenous therapy. One course.

419. Rehabilitation. An eight-week rotation studying the treatment of limitations caused by disease and injury. The student receives training in patient rehabilitation through participation in both inpatient and outpatient physical and occupational therapy services and weekly medical-surgical-rehabilitation conferences. Instruction is oriented toward the early return to work of disabled employees and matching physical capabilities with job demands. One course.

420. Plastic Dressing Room. A four-week experience with extensive exposure to the spectrum of congenital disease, cancer and trauma treated by the plastic surgical service. The student actively participates in the preparation, debridement and dressing of wounds; planning and following the patient's post-operative course; and recording the physical findings, progress and prognosis in the patient's chart. All teaching rounds and conferences are required while on the service. Half-course.

Pediatrics

511. General Pediatrics. An eight-week clinical experience divided into three sections: newborn nursery, inpatient service, and outpatient clinic. Attendance at all general pediatric conferences and other pertinent additional teaching conferences is required. Emphasis is placed on performing peripheral venopunctures, starting and regulating intravenous infusions, performing complete blood counts,

urinalyses, blood, stool, urine and umbilical cultures, immunizations, phenol-ketonic screening studies, visual screening studies, and electrocardiograms as pertinent to children and infants. The student is exposed to childhood illnesses and normal variations of growth and development. Besides learning to take third party histories and perform pediatric physical examinations, the student observes and participates in the activities of the intensive care nursery, and learns specific techniques used in the care of the immature and sick newborn. One course.

513. Clinical Research Unit. An eight-week rotation covering diversified pediatric inpatient problems. The student develops proficiency in a variety of clinical procedures used in evaluating complex pediatric conditions. Attendance at all daily teaching rounds is required as well as carrying out diagnostic studies as instructed by the attending physician including: routine laboratory analyses, tolerance testing (intravenous glucose, insulin and tolbutamide studies), intravenous catheterizations, venous cutdowns, nasogastric intubations and gastric analyses. The student is responsible for eliciting, recording, and reporting clinical and laboratory data and expanding the ability to correlate clinical signs and symptoms with laboratory data. One course.

514. Pediatric Outpatient. An eight-week clinical experience emphasizing the diagnostic and therapeutic aspects of a pediatric outpatient service. In order to gain insight into the common medical and behavioral problems encountered in an outpatient service of this type, the teaching is provided in a setting outside of the medical center. One course.

515. Pediatric Chest and Allergy. An eight-week rotation providing an understanding of patients with allergic and respiratory conditions. This course facilitates expanding a knowledge of the therapeutic regimen—their indications, availability, reliability, and limitations—in the treatment of respiratory and allergic disease. The student develops a proficiency at collecting necessary diagnostic samples and carrying out numerous indicator studies on the involved pediatric population in addition to participating in the evaluation of admissions and all service teaching rounds and conferences. One course.

516. Pediatric Behavioral Problems. An eight-week clinical experience providing an insight and understanding of subjective and objective indicators of behavioral abnormalities in the pediatric patient. Clinical analyses of inpatients and outpatients together with clinical teaching rounds provides the student with the ability to elicit and record essential data as it pertains to both normal and abnormal behavioral patterns. One course.

Obstetrics and Gynecology

650. Obstetrics/Gynecology. An eight-week clinical experience studying a broad spectrum of obstetrical and gynecological problems. While on the obstetric service, the management of pregnancy, labor, and delivery including antenatal, natal, and postnatal complications is taught. The student is responsible for taking obstetrical histories, performing obstetrical physical examinations, and following patients through labor, delivery, and the early postpartum period. While on the gynecologic service the student is exposed to methods and programs relating to cancer detection and venereal disease and birth control. Learning to take gynecologically oriented patient histories and perform complete and accurate gynecologic examinations is required. Attendance at all obstetrical and gynecological teaching rounds, conferences, and seminars is also required. One course.

651. Office Gynecology. A four-week clinical experience reviewing a spectrum of gynecologic disease processes. The student is exposed to programs relating to cancer detection and venereal disease and birth control. Learning to take gynecologically oriented patient histories and perform accurate gynecologic examinations is required. While on the rotation the student is familiarized with the principles of office gynecology and participates in daily rounds, teaching conferences and seminars. Half-course.

Psychiatry

751. General Psychiatry. An eight-week clinical experience in general psychiatry that is geared to the individual's needs and desires. Students have the opportunity to concentrate their attention in any one area of psychiatry or establish a general program as a survey of the many clinical components of psychiatry including psychotherapy, neuropsychiatry, psychochemotherapeutics, and psychological testing and psychoevaluation. Students on this rotation attend regular ward rounds, teaching conferences, and seminars. One course.

752. Personality and Development. A course covering the behavioral stages of development, including prenatal and nutritional factors, psychosexual stages and socio-cultural aspects, as related to personality development. Open only to students majoring in psychiatry. Half-course.

753. Psychiatric Examination and Interview. A course providing an understanding of the appearances, affects and evaluation of various mental states. The student learns direct and non-directive interview techniques and the examination of the uncooperative patient. Open only to students majoring in psychiatry. Half-course.

754. Psychopathology. A course surveying the structural and functional changes resulting from anxiety, depressive and obsessive compulsive neuroses, schizophrenia, manic depressive illness, personality disorders, disorders of adolescence, sexual deviations, drug addiction and alcoholism. Open only to students majoring in psychiatry. Half-course.

755. Psychotherapy. A course teaching an understanding of the historical perspectives, principles, mental mechanisms, body language, communication and the intrapsychic dynamics and symbolism that are important to and involved in the effective practice of psychotherapy. Through the use of audiovisual aids the student observes clinical demonstrations and participates in psychotherapy sessions. Open only to students majoring in psychiatry. Half-course.

756. Group Psychotherapy. A course studying group dynamics, treatment models, analytically oriented groups, transactional therapy, encounter groups, "T" groups, special group situations and the implementation and management technique of group therapy. Open only to students majoring in psychiatry. Half-course.

757. Milieu and Behavior Therapy. A course reviewing milieu therapy, its importance, theory, practice and program structure. Goals and the concept of team therapy are also studied. Open only to students majoring in psychiatry. Half-course.

758. Neuroanatomy. A course dealing with the activity of the nervous system, including the embryology of the central nervous system; neuronal and membrane structure; organization of the brain stem, diencephalon, telencephalon basal ganglion, cerebral hemispheres, cerebellum, the extra-pyramidal system, and the

autonomic nervous system. Open only to students majoring in psychiatry. Half-course.

759. Neurophysiology. A course examining electroencephalographic recording and evaluating techniques, epilepsy, space occupying lesions, head injuries, vascular lesions, encephalopathies and psychiatric disorders. Open to students majoring in psychiatry. Half-course.

760. Psychopharmacology. A course covering hypnotics and sedatives; central nervous system stimulants; analgesics and antipyretics; neurohumeral transmission, anticholinergic, parasympathomimetic, hallucinogenic and post ganglionic blocking agents; minor and major tranquilizers; anti-depressants; and drug addiction. Open only to students majoring in psychiatry. Half-course.

761. Neurochemistry. A course surveying neurochemistry, from its historical development to biochemical theories of thought, including: cerebral composition, respiration, lipids and leukodystrophies; metabolism of amino acids; protein content of nervous tissue; cerebrospinal fluid and cerebral edema; neurotransmitters; catecholamines, schizophrenia and affective disorders; other biochemical approaches to schizophrenia; and hallucinogens. Open only to students majoring in psychiatry. Half-course.

762. Neuropathology. A course teaching the structural and functional changes resulting from brain tumors, trauma, extrapyramidal disorders, congenital or developmental defects and neuromuscular, vascular, infectious, and degenerative brain diseases. Open only to students majoring in psychiatry. Half-course.

763. Neuroradiology. A course studying the routine skull film, cerebral angiography, pneumo-encephalography, nuclear medical techniques and brain scan interpretation. Open only to students majoring in psychiatry. Half-course.

764. Psychosomatic Medicine. A course reviewing theories of mind and body inter-relations and some of the resulting physical manifestations, including allergies, dermatological disorders, asthma, cardiovascular disorders, upper and lower gastrointestinal disorders, genito-urinary problems, menstrual disorders, and pregnancy and post-partum problems. Open only to students majoring in psychiatry. Half-course.

765. Psychological Testing. A course covering the various aspects of psychological testing, from ethics and legality to the Wechsler scales and the Minnesota Multiphasic Personality Inventory. Also included is work with testing theory and construction; reliability, validity, and generalization; intelligence testing; group intelligence testing; practice in administration, scoring and interpretation; projective, objective structural and major protective personality assessment; and tests for brain damage. Open only to students majoring in psychiatry. Half-course.

Pathology

800. Pathology Core. The fundamentals of pathology are presented by a correlated study of gross and microscopic material illustrating the structural changes in disease. Lectures developing broad concepts of disease processes are given by the members of the senior staff. Conferences with small groups of students under the guidance of a staff member are scheduled for the purpose of developing more personal discussions. The emphasis of the course is on the etiology and pathogenesis of disease and the experimental approach to the under-

standing of disease processes. Open only to students majoring in pathology. One course.

801. Introduction to Histology. A four-week rotation surveying histologic techniques and equipment necessary for the preparation of tissue slides. The student is taught basic principles of tissue processing, including fixation, decalcification, hand and automatic processing, blocking, embedding, cutting and staining, specific staining and histochemical procedures, cutostat and other frozen section methods, tissue manicuring for processing, and selective electron microscopic and cytologic techniques. Open only to students majoring in pathology. Half-course.

802. Introduction to Pathology. A clinical laboratory and discussion course teaching disease concepts and processes including the background, the nature and the causes of diseases. The student develops an ability to analyze a disease in much the same way as the skilled chemist who, on viewing the structural formula of a compound, may predict many of its properties. The main principles include the study of circulatory disturbances, degenerative processes, infiltrations and metabolic disorders, disturbances of development and growth, the inflammatory process (including its etiologic and pathogenic considerations), regeneration and repair, and neoplasia. Lectures and discussions within these categories are presented by the faculty and the students. Student papers discussing and interpreting pathogenesis are requested. Open only to students majoring in pathology. One course.

803. Systemic Pathology. A clinical laboratory discussion course studying clinico-pathologic data as it pertains to specific organ systems. Disease processes are studied with the intention of enabling students to crystallize the basic concepts studied in general pathology. Clinico-pathologic correlation is stressed utilizing gross and microscopic examples of disease processes, case studies, lectures, and demonstrations. Open only to students majoring in pathology. Half-course.

804. Pathological Anatomy. An introduction to organ anatomy as experienced with postmortem dissections. Didactic instruction is correlated with autopsy room dissection findings to facilitate the comparison of normal anatomical structures with pathological states. An indepth discussion of systemic anatomy is undertaken to better prepare the student for his autopsy room rotation. Open only to students majoring in pathology. Half-course.

805. Clinical Histology. A course reviewing tissue and cell morphology and physiology. Emphasis is placed on cellular and subcellular structures which influence the determination of tissue types. A synthesis of current concepts of ultra-structure are related to those of light microscopy. Students learn to evaluate and interpret, under light microscopy, those features which distinguish one tissue from another. The interrelationship between cytology, histology and organology is stressed. Open only to students majoring in pathology. Half-course.

806. Medical Photography. A course that covers basic photographic theory and principles including lighting, optics, photochemistry, camera handling techniques, color film selection, exposure determinations, and film processing as applied to pathology. Half-course.

807. Clinical Pathology. A twelve-week clinical experience in gross and microscopic pathology. A detailed consideration of the morphologic, physiologic, and biochemical manifestations of disease is presented. In addition, the student participates in the gross dissection, histologic examination, processing and analysis of morphologic, biochemical, and microbiological data, and the final interpretation

and correlation of these data. Open only to students majoring in pathology. One and one-half courses.

808. Infectious Diseases. A four-week clinical rotation surveying the findings and effects of numerous pathogenic bacteria and fungi as they relate to infectious disease processes. The student learns to differentiate between normal flora, potentially-harmful flora, and highly virulent pathogens, and correlate these findings with their clinical manifestations. Antibiotic sensitivity patterns of bacteria are determined and interpreted on all pathogenic or potentially pathogenic bacteria isolated from clinical specimens. Half-course.

809. Introductory Immunology. A course teaching the basic techniques, equipment, procedures and objectives of immunology. Content of the course, through lectures, reading and laboratory experiences, includes basic immunologic reactions, immunochemistry and immunopathology. Open only to students majoring in pathology. Half-course.

810. Advanced Immunology. A continuation course in which laboratory research may be undertaken on a problem pertinent to the field. The student continues the study of immunology through lectures, reading and assigned laboratory problems, thereby developing the abilities necessary to function in an immunologic setting. Laboratories involved in immunology and immunopathology are available so that the student can become acquainted with the overall concept of immunology as it relates to a medical center. Open only to students majoring in pathology. Half-course.

Map of the Medical Center



1. Gerontology
2. M & I No. 3
3. Clinical Research No. 1
4. Main Entrance Hospital
5. Clinical Research No. 2
6. Baker House
7. School of Medicine (Davison Building)
8. Duke Hospital
9. Bell Bldg.
10. Hanes Annex
11. Graduate Center
12. Medical Sciences Bldg. No. 1
13. Training Center Bldg. No. 1
14. Marshall Pickens Rehab. Cnt.
15. Training Center Bldg. No. 2
- 16.
17. Research Park Bldg. No. 1
18. Research Park Bldg. No. 2
19. Research Park Bldg. No. 3
20. Research Park Bldg. No. 4
21. 220 Anderson St.
22. Child Guidance Clinic
23. Vivarium
24. 2015 Erwin Road
25. 2013
26. 2013
27. Civitan Bldg.
28. M. C. Personnel Bldg.
29. Volatile Storage
30. 2214 Erwin Road
31. 2212 Erwin Road
32. Maint. Whse. & Garage
33. Medical Research Laboratories (Old Laundry)
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Duke University Medical Center

DURHAM, NORTH CAROLINA

DEPARTMENT OF COMMUNITY HEALTH SCIENCES
PHYSICIANS ASSOCIATE PROGRAM

POSTAL CODE 27710
TELEPHONE 919-684-6134

Notice to Applicants.

In order to insure fairness to all who apply to the Duke University Physician's Associate Program, it is necessary that the following forms and requirements be complied with, in complete and accurate detail. Until an applicant's file is complete in every respect he will not be considered by the Committee on Admissions for acceptance into the program.

Applicants will be required to interview in person prior to final action on their application by the Committee on Admissions. At any rate applicants are encouraged to visit the University and members of the Program administrative staff and faculty. This should in all cases be done by pre-arranged appointments through correspondence with the Program administration. Such arrangements will not be considered until the applicant's application file is complete.

It should be noted that for an application file to be complete it must contain the following: 1.) A completed application form with a current personal photograph; 2.) Three evaluation forms including one from a physician with whom you have recently worked, one from your current supervisor or commanding officer, and one from a personal acquaintance of five or more years; 3.) A one page typewritten narrative on why you want to be a physician's associate; 4.) Scores from the College Entrance Examination Board including both the verbal and math portions of the Scholastic Aptitude Test; 5.) Transcripts of all grades from high school, college, and business, technical, trade, and military schools; 6.) A copy of U.S. Government Form DD214 (Discharge Orders) from all who have completed a tour of duty with the armed forces; and 7.) A check or money order for ten dollars payable to the Duke University Physician's Associate Program which is used to defray the cost of application processing.

Because of frequent unanticipated delays in the accumulation of the required information, applicants are encouraged to pursue their application with early dedication. Applications to be considered for the class beginning in August must be completed no later than the preceding April 1st (except for scores from SAT tests taken in March). All applicants will be notified of the Committee's final decision by June 1st. All information received becomes the property of the Physician's Associate Program and will not be returned.

Because of the rapid growth and expansion in the Physician's Associate Program, changes in procedure, regulations, and curriculum are constant occurrences. Applicants will be informed of pertinent developments which makes it imperative that we be informed of changes in your mailing address.

If you have any questions please address them to: The Physician's Associate Program, P. O. Box 2914 Duke Hospital, Durham, North Carolina 27710.

DUKE UNIVERSITY MEDICAL SCHOOL
PHYSICIAN'S ASSOCIATE PROGRAM
APPLICATION FOR ADMISSION

Note: A check or money order for \$10.00 must accompany this application form to defray the cost of processing.
Please type or print in ink.

Name _____
Last First Middle

Social Security Number _____

Date of Birth _____; Sex: _____ Male; _____ Female
Month Day Year

Application for class beginning in August of _____

Application is not
complete unless a
2" x 2½" recent
photo is attached
here.

A GENERAL INFORMATION

A. Permanent Address _____
Number and Street or Post Office Box

City State Zip

B. Mailing Address _____ C. Telephone _____
Number and Street or Post Office Box Area

City State Zip Number Extension

D. Marital Status 1 _____ Single, 2 _____ Married, 3 _____ Widowed, 4 _____ Separated, 5 _____ Divorced

E. Spouse 1. Name _____ 2. _____
First Maiden Occupation

F. Family 1. Number of Dependents _____ 2. Ages of Dependents _____
Descending Order

G. Number of days missed from school or work during the past two years _____

H. Height _____ I. Weight _____ J. Country of Citizenship _____
Feet and Inches Pounds

K. List all serious illnesses, operations, and physical disabilities: _____

B MILITARY SERVICE

A Branch _____ B Date Entered Active Duty _____
C Date of Discharge _____ D Present or Final Rank _____
E Total Months Active Duty _____ F Total Months Reserve Duty _____
G Selective Service Classification _____ H Total Months National Guard Duty _____
I Lottery Number _____

C EDUCATIONAL INFORMATION

List the following information for each school you have attended. Include high school, college, and business, technical, trade and military schools. Start with the first senior high school you attended and list all other schools in chronological order.

A. High School

School Name _____	From Mo. & Yr. _____	To Mo. & Yr. _____
Address _____	Full or Part Time _____	Date of Graduation _____
City _____ State _____ Zip _____	Type of curriculum or course major _____	

B. High School

School Name _____	From Mo. & Yr. _____	To Mo. & Yr. _____
Address _____	Full or Part Time _____	Date of Graduation _____
City _____ State _____ Zip _____	Type of curriculum or course major _____	

C. College

School Name _____	From Mo. & Yr. _____	To Mo. & Yr. _____
Address _____	Full or Part Time _____	Date of Graduation _____
City _____ State _____ Zip _____	Type of curriculum or course major _____	

D. College

School Name _____	From Mo. & Yr. _____	To Mo. & Yr. _____
Address _____	Full or Part Time _____	Date of Graduation _____
City _____ State _____ Zip _____	Type of curriculum or course major _____	

E. Military, Business, or Technical School

School Name _____	From Mo. & Yr. _____	To Mo. & Yr. _____
Address _____	Full or Part Time _____	Date of Graduation _____
City _____ State _____ Zip _____	Type of curriculum or course major _____	

D MEDICAL EXPERIENCE

- A Total months of direct patient contact _____
- B Months in 1. Medicine _____ 2. Surgery _____ 3. Pediatrics _____ 4. Psychiatry _____
5. Obstetrics & Gynecology _____ 6. Other (specify) _____
- C Total months of laboratory experience _____
- D Months in 1. X-ray _____ 2. Hematology _____ 3. Bacteriology _____
4. Chemistry _____ 5. Blood Bank _____ 6. Other (specify) _____

E Give the following information for all medically related positions held.

1	From Mo. & Yr. _____	To Mo. & Yr. _____	Position _____	Description of Duties _____
2	From Mo. & Yr. _____	To Mo. & Yr. _____	Position _____	Description of Duties _____
3	From Mo. & Yr. _____	To Mo. & Yr. _____	Position _____	Description of Duties _____
4	From Mo. & Yr. _____	To Mo. & Yr. _____	Position _____	Description of Duties _____
5	From Mo. & Yr. _____	To Mo. & Yr. _____	Position _____	Description of Duties _____
6	From Mo. & Yr. _____	To Mo. & Yr. _____	Position _____	Description of Duties _____

E MISCELLANEOUS INFORMATION

- A Present Occupation _____ Name of Supervisor _____
- B Employer _____

- C Have you ever applied to the Duke University Physician's Associate Program before? _____
If yes in what year? _____
- D Have you ever been convicted of a crime (other than minor traffic violations)? _____
If yes give details in a separate statement
- E Have you ever been disciplined by college, administrative, military, or other authorities? _____
If yes give details in a separate statement
- F Personal evaluation forms are to be filled out by your references and mailed directly to the Physician's Associate Program Committee on Admissions
- 1) To be completed by a physician with whom you have worked:

Name

Address

City

State

Zip

2) To be completed by your present commanding officer or supervisor:

3) To be completed by an unrelated personal acquaintance of five or more years:

G. Attach to this application a one page typewritten narrative of why you want to be a physician's associate.

H. List in order of preference the area of medicine in which your interests lie, for example, family practice, internal medicine, general surgery, pediatrics, psychiatry, cardiology, neurology, orthopedics, ophthalmology, obstetrics, gynecology, etc. If none so state.

1) _____ 2) _____ 3) _____

I. If you have not previously taken the Scholastic Aptitude Test of the College Entrance Examination Boards, on what date do you plan to do so? _____

I hereby apply for admission to the Duke University Physician's Associate Program and promise, if admitted, to abide by all rules and regulations of the University, The Medical School, and the Physician's Associate Program, with the understanding that the program reserves the right to compel the withdrawal of any student whose conduct at any time is not satisfactory to the University, The Medical School, or the Physician's Associate Program.

Date _____ Signature _____

Please mail this form and all future correspondence to:

Committee on Admissions
Physician's Associate Program
P. O. Box CHS 2914
Duke University Medical Center
Durham, North Carolina 27710

**DUKE UNIVERSITY MEDICAL CENTER
PHYSICIAN'S ASSOCIATE PROGRAM
APPLICANT EVALUATION FORM**

Note: Evaluator: Please mail this form directly to:
Committee on Admissions
Physician's Associate Program
P. O. Box 2914 Duke Hospital
Durham, North Carolina 27710

Applicant: Please fill in your name,
social security number, and mailing
address.

Applicant's Name _____
Last First Middle

Applicant's Mailing Address _____
Number City State Zip

Social Security Number _____

A. EVALUATOR INFORMATION

- A. How many year have you known the applicant? _____
- B. Your relationship to the applicant is that of:
- | | |
|----------------------------|-------------------------------|
| 1) _____Employer | 4) _____Co-worker |
| 2) _____Supervisor | 5) _____Personal acquaintance |
| 3) _____Commanding Officer | 6) _____Other |
- C. Your occupation is:
- | | |
|-------------------------------|-----------------------------------|
| 1) _____Physician | 4) _____Other health professional |
| 2) _____Nurse | 5) _____Administrator |
| 3) _____Laboratory technician | 6) _____Other |

B. APPLICANT EVALUATION

Please evaluate the applicant on his actual observed performance as compared with others of the same rate. If not observed please check the appropriate box.

- A. MOTIVATION: The desire of the applicant to increase his capability to contribute to his organization and to society in general.
- | | |
|-------------------------------|----------------------|
| 1) _____Highly motivated | 4) _____Purposeless |
| 2) _____Effectively motivated | 5) _____Not observed |
| 3) _____Inconsistent | |
- B. INDUSTRY: The applicant's capability as reflected by his work
- | | |
|-----------------------------------|---|
| 1) _____Seeks additional work | 4) _____Shirks duties even under pressure |
| 2) _____Effectively motivated | 5) _____Not observed |
| 3) _____Needs occasional prodding | |
- C. LEADERSHIP: The applicant's ability to plan and assign work to others and effectively direct their activities.
- | | |
|---|-------------------------------------|
| 1) _____Judgment respected, prompts cooperation | 4) _____Unable to lead or supervise |
| 2) _____Contributes in important matters, leads effectively | 5) _____Not observed |
| 3) _____Occasionally leads with good results | |
- D. CONCERN FOR OTHERS: The thought and consideration of others' feelings and the applicant's ability to view the parameters of existing circumstances.
- | | |
|--|----------------------|
| 1) _____Sincerely and actively concerned | 4) _____Indifferent |
| 2) _____Generally concerned | 5) _____Not observed |
| 3) _____Occasionally concerned | |
- E. RESPONSIBILITY: The applicant's ability to assume moral and mental accountability for inherent burdens of work and society.
- | | |
|--|----------------------|
| 1) _____Consistently and reliably assumes responsibility | 4) _____Unreliable |
| 2) _____Consciously assumes responsibility | 5) _____Not observed |
| 3) _____Generally dependable | |
- F. INTEGRITY: The applicant's adherence to honesty in his dealings with others.
- | | |
|-----------------------------------|------------------------|
| 1) _____Consistently trustworthy | 4) _____Not dependable |
| 2) _____Generally honest | 5) _____Not observed |
| 3) _____Occasionally questionable | |

G. EMOTIONAL STABILITY: The applicant's ability to react under stress in a mature and dependable manner.

- | | |
|---|--|
| 1)___Exceptionally stable | 4)___Generally hyperemotional or apathetic |
| 2)___Well balanced in most situations | 5)___Not observed |
| 3)___Excitable or unresponsive under stress | |

H. ADAPTABILITY: The applicant's ability to work with and under others' direction.

- | | |
|--|--------------------------------------|
| 1)___Relates exceptionally well and promotes good morale | 4)___Unable to work well with others |
| 2)___Relates well and contributes to good morale | 5)___Not observed |
| 3)___Generally cooperative in working with others | |

I. APPEARANCE: The applicant's appearance expressed by his neatness in person and dress.

- | | |
|---|-------------------------------------|
| 1)___Always neat, takes pride in appearance | 4)___Generally sloppy and offensive |
| 2)___Generally neat and acceptably clean | 5)___Not observed |
| 3)___Frequently careless | |

J. PROFESSIONAL SKILLS: The applicant's ability to learn and perform tasks related to his occupation

- | | |
|--|---|
| 1)___Extremely effective and reliable | 4)___Unreliable even with routine supervision |
| 2)___Reliable with occasional supervision | 5)___Not observed |
| 3)___Works well but requires routine supervision | |

K. PATIENT RAPPORT: The applicant's ability to relate with ill people in such a way as to promote confidence and understanding.

- | | |
|--|--|
| 1)___Promotes confidence & consistently exercises discretion | 4)___Tends to be unconcerned & upsets patients |
| 2)___Relates well with sick people | 5)___Not observed |
| 3)___Has difficulty in developing rapport with patients | |

L. ATTENDANCE: The reliability of the applicant to be at designated functions and to be on time.

- | | |
|--|---|
| 1)___Always present and on time | 4)___Frequent unexcused absences and/or perpetual tardiness |
| 2)___Usually present and/or occasionally late | 5)___Not observed |
| 3)___Unreliable in attendance and/or frequently late | |

M. INTERPERSONAL RELATIONS: The ability of the applicant to develop a relationship by means of his poise, personality and social graces.

- | | |
|---|---|
| 1)___Impressive and at ease under any conditions | 4)___Frequently ill at ease even with peers |
| 2)___Generally at ease but fidgety in the presence of socially successful professionals | 5)___Not observed |
| 3)___Frequently ill at ease with professionals | |

C. MISCELLANEOUS INFORMATION AND COMMENTS. Please give any additional information you feel might be helpful

in evaluating this applicant. _____

D. SUMMARY RECOMMENDATION

- A. I would highly recommend this applicant for admission
B. I feel this candidate is qualified and competent for admission
C. I would not recommend this applicant for admission

This evaluation form was completed by me personally and it is my understanding that the information provided will be used by the Duke University Physician's Associate Program and will be held in confidence.

Date _____ Signed _____

Name _____
Last First Middle

Title _____

Address _____

City _____ State _____ Zip _____

Telephone: Area _____ Number _____ Extension _____

**DUKE UNIVERSITY MEDICAL CENTER
PHYSICIAN'S ASSOCIATE PROGRAM
APPLICANT EVALUATION FORM**

Note: Evaluator: Please mail this form directly to:
Committee on Admissions
Physician's Associate Program
P. O. Box 2914 Duke Hospital
Durham, North Carolina 27710

Applicant: Please fill in your name,
social security number, and mailing
address.

Applicant's Name _____
Last First Middle

Applicant's Mailing Address _____
Number City State Zip

Social Security Number _____

A. EVALUATOR INFORMATION

A. How many year have you known the applicant? _____

B. Your relationship to the applicant is that of:

- | | |
|----------------------------|-------------------------------|
| 1) _____Employer | 4) _____Co-worker |
| 2) _____Supervisor | 5) _____Personal acquaintance |
| 3) _____Commanding Officer | 6) _____Other |

C. Your occupation is:

- | | |
|-------------------------------|-----------------------------------|
| 1) _____Physician | 4) _____Other health professional |
| 2) _____Nurse | 5) _____Administrator |
| 3) _____Laboratory technician | 6) _____Other |

B. APPLICANT EVALUATION

Please evaluate the applicant on his actual observed performance as compared with others of the same rate. If not observed please check the appropriate box.

A. MOTIVATION: The desire of the applicant to increase his capability to contribute to his organization and to society in general.

- | | |
|-------------------------------|----------------------|
| 1) _____Highly motivated | 4) _____Purposeless |
| 2) _____Effectively motivated | 5) _____Not observed |
| 3) _____Inconsistent | |

B. INDUSTRY: The applicant's capability as reflected by his work

- | | |
|-----------------------------------|---|
| 1) _____Seeks additional work | 4) _____Shirks duties even under pressure |
| 2) _____Effectively motivated | 5) _____Not observed |
| 3) _____Needs occasional prodding | |

C. LEADERSHIP: The applicant's ability to plan and assign work to others and effectively direct their activities.

- | | |
|---|-------------------------------------|
| 1) _____Judgment respected, prompts cooperation | 4) _____Unable to lead or supervise |
| 2) _____Contributes in important matters, leads effectively | 5) _____Not observed |
| 3) _____Occasionally leads with good results | |

D. CONCERN FOR OTHERS: The thought and consideration of others' feelings and the applicant's ability to view the parameters of existing circumstances.

- | | |
|--|----------------------|
| 1) _____Sincerely and actively concerned | 4) _____Indifferent |
| 2) _____Generally concerned | 5) _____Not observed |
| 3) _____Occasionally concerned | |

E. RESPONSIBILITY: The applicant's ability to assume moral and mental accountability for inherent burdens of work and society.

- | | |
|--|----------------------|
| 1) _____Consistently and reliably assumes responsibility | 4) _____Unreliable |
| 2) _____Consciously assumes responsibility | 5) _____Not observed |
| 3) _____Generally dependable | |

F. INTEGRITY: The applicant's adherence to honesty in his dealings with others.

- | | |
|-----------------------------------|------------------------|
| 1) _____Consistently trustworthy | 4) _____Not dependable |
| 2) _____Generally honest | 5) _____Not observed |
| 3) _____Occasionally questionable | |

- C. MISCELLANEOUS INFORMATION AND COMMENTS. Please give any additional information you feel might be helpful in evaluating this applicant.

A. I would highly recommend this applicant for admission

B. I feel this candidate is qualified and competent for admission

C. I would not recommend this applicant for admission

Date _____ Signed _____

Name _____
Last First Middle

Title _____

Address _____

City _____ State _____ Zip _____

Telephone: Area _____ Number _____ Extension _____

**DUKE UNIVERSITY MEDICAL CENTER
PHYSICIAN'S ASSOCIATE PROGRAM
APPLICANT EVALUATION FORM**

Note: Evaluator: Please mail this form directly to:
Committee on Admissions
Physician's Associate Program
P. O. Box 2914 Duke Hospital
Durham, North Carolina 27710

Applicant: Please fill in your name,
social security number, and mailing
address.

Applicant's Name _____
Last First Middle

Applicant's Mailing Address _____
Number City State Zip

Social Security Number _____

A. EVALUATOR INFORMATION

A. How many year have you known the applicant? _____

B. Your relationship to the applicant is that of:

1)____Employer

4)____Co-worker

2)____Supervisor

5)____Personal acquaintance

3)____Commanding Officer

6)____Other

C. Your occupation is:

1)____Physician

4)____Other health professional

2)____Nurse

5)____Administrator

3)____Laboratory technician

6)____Other

B. APPLICANT EVALUATION

Please evaluate the applicant on his actual observed performance as compared with others of the same rate. If not observed please check the appropriate box.

A. MOTIVATION: The desire of the applicant to increase his capability to contribute to his organization and to society in general.

1)____Highly motivated

4)____Purposeless

2)____Effectively motivated

5)____Not observed

3)____Inconsistent

B. INDUSTRY: The applicant's capability as reflected by his work

1)____Seeks additional work

4)____Shirks duties even under pressure

2)____Effectively motivated

5)____Not observed

3)____Needs occasional prodding

C. LEADERSHIP: The applicant's ability to plan and assign work to others and effectively direct their activities.

1)____Judgment respected, prompts cooperation

4)____Unable to lead or supervise

2)____Contributes in important matters, leads effectively

5)____Not observed

3)____Occasionally leads with good results

D. CONCERN FOR OTHERS: The thought and consideration of others' feelings and the applicant's ability to view the parameters of existing circumstances.

1)____Sincerely and actively concerned

4)____Indifferent

2)____Generally concerned

5)____Not observed

3)____Occasionally concerned

E. RESPONSIBILITY: The applicant's ability to assume moral and mental accountability for inherent burdens of work and society.

1)____Consistently and reliably assumes responsibility

4)____Unreliable

2)____Consciously assumes responsibility

5)____Not observed

3)____Generally dependable

F. INTEGRITY: The applicant's adherence to honesty in his dealings with others.

1)____Consistently trustworthy

4)____Not dependable

2)____Generally honest

5)____Not observed

3)____Occasionally questionable

Date _____ Signed _____

Name _____
Last First Middle

Title _____

Address _____

City _____ State _____ Zip _____

Telephone: Area _____ Number _____ Extension _____

BULLETIN OF DUKE UNIVERSITY
Physician's Associate Program

Vol. 44 No. 9 April 1972



Bulletin of Duke University 1972-1973

Divinity School



Bulletin of Duke University

Divinity School

1972-1973

Durham, North Carolina 1972

Volume 44

August, 1972

Number 12

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Calendar of the Divinity School

1972

September

- 5 Tuesday, 8:00 a.m.—Dormitories open for occupancy
- 5 Tuesday, 2:00 p.m.—Orientation Program for new students begins
- 6 Wednesday, 9:00 a.m.—Orientation continues
- 6 Wednesday, 9:00 a.m.-12:00 noon—Registration of returning students
- 6 Wednesday, 1:00 p.m.-4:00 p.m.—Registration of new students
- 7 Thursday, 8:20 a.m.—Classes begin
- 7 Thursday, 9:20 a.m.—Divinity School Opening Convocation
- 11 Monday, 10:00-12:00 noon—Testing of all new students
- 21 Thursday—Last day for changing courses for the fall semester
- 18 Monday, 10:00 a.m.-12:00 noon—Testing of all new students

October

- 30-11/1 Monday-Wednesday—Divinity School Convocation and Pastors' School with Gray Lectures

November

- 13-14 Monday-Tuesday—Preregistration for spring semester, 1973
- 22 Wednesday, 5:00 p.m.—Thanksgiving recess begins
- 27 Monday, 8:20 a.m.—Classes resume

December

- 10 Sunday—Founders' Day
- 11-13 Monday-Wednesday—Reading Period
- 13 Wednesday—Fall semester classes end
- 14 Thursday—Final examinations begin
- 21 Thursday—Final examinations end

1973

January

- 15 Monday—Registration and matriculation of new and preregistered students
- 16 Tuesday, 8:20 a.m.—Spring semester classes begin
- 23 Tuesday—Last day for changing courses

March

- 16 Friday, 6:00 p.m.—Spring recess begins
- 26 Monday, 8:20 a.m.—Classes are resumed

April

- 10 Tuesday—Preregistration for fall semester, 1973
- 25 Wednesday, 10:00 a.m.—Divinity School Closing Convocation
- 27 Friday, 6:00 p.m.—Spring semester classes end
- 28-30 Saturday-Monday—Reading period

May

- 1 Tuesday, 8:20 a.m.—Final examinations begin
- 8 Tuesday, 5:00 p.m.—Final examinations end
- 12 Saturday—Commencement begins, Divinity School Baccalaureate Service, 7:30 p.m.
- 13 Sunday—Commencement Baccalaureate Service and Graduation Exercises

University Administration

General Administration

Terry Sanford, J.D., LL.D., D.H., L.H.D., D.P.A., *President*
John O. Blackburn, Ph.D., *Chancellor*
Frederic N. Cleaveland, Ph.D., *Provost*
Charles B. Huestis, *Vice President for Business and Finance*
William G. Anlyan, M.D., *Vice President for Health Affairs*
Frank Leon Ashmore, A.B., *Vice President for Institutional Advancement*
Gerhard Chester Henriksen, M.A., C.P.A., *Vice President and Treasurer*
Harold W. Lewis, Ph.D., *Vice Provost and Dean of the Faculty*
John C. McKinney, Ph.D., *Vice Provost and Dean of the Graduate School*
James L. Price, Ph.D., *Vice Provost and Dean of Undergraduate Education*
*Craufurd D. Goodwin, Ph.D., *Vice Provost and Director of International Programs*
Thomas F. Keller, Ph.D., *Vice Provost*
Joel L. Fleishman, LL.M., *Vice Chancellor for Public Policy Education and Research; Director of Institute of Policy Sciences and Public Affairs*
Benjamin Edward Powell, Ph.D., *Librarian*
Clark R. Cahow, Ph.D., *University Registrar*
J. Peyton Fuller, A.B., *Controller*
Rufus H. Powell, LL.B., *Secretary of the University*
Stephen Cannada Harward, A.B., C.P.A., *Assistant Secretary and Assistant Treasurer*
Victor A. Bubas, B.S., *Assistant to the President*
A. Kenneth Pye, LL.M., *University Counsel*

Divinity School Educational Administration

Thomas A. Langford (1956), B.D., Ph.D., *Dean of the Divinity School*
Robert Terry Young (1970), B.D., *Assistant Dean for Admissions and Student Affairs*
Joseph B. Bethea (1972), B.D., *Director of Black Church Studies*
Early Clifford Shoaf (1972), B.D., *Director of Field Education*
†Helen Mildred Kendall (1950), A.B., *Administrative Assistant and Registrar*
Shirley O'Neal (1966), *Administrative Assistant for General Administration and Finance*

Division of Advanced Studies

Waldo Beach (1946), B.D., Ph.D., *Supervisor, Master of Theology Program*
Franklin W. Young (1968), B.D., Ph.D., *Director of Graduate Studies in Religion*

Division of Special Studies

James M. Efrid (1962), B.D., Ph.D., *Director of Student Academic Affairs*
Richard A. Goodling (1959), B.D., Ph.D., *Director, Programs in Pastoral Psychology*
P. Wesley Aitken (1963), B.D., Th.M., *Director, Clinical Pastoral Education*
William Arthur Kale (1952), B.D., D.D., *Director, the Master of Religious Education Program*
Stuart C. Henry (1959), B.D., Ph.D., *Supervisor, Honors Program*
McMurry S. Richey (1954), B.D., Ph.D., *Director of Continuing Education*

Library

Donn Michael Farris (1950), B.D., M.S. in L.S., *Librarian*
Harriet V. Leonard (1960), B.D., M.S. in L.S., *Reference Librarian*
Ashley Kerst, *Circulation Librarian*
Sue Johnson, *Assistant Circulation Librarian*

*Leave of absence through August, 1972.

†Retires 8-31-72.

Faculty and Staff

- Lloyd Richard Bailey (1971), B.D., Ph.D., *Associate Professor of Old Testament*
 *Frank Baker (1960), B.D., Ph.D., *Professor of English Church History*
 Waldo Beach (1946), B.D., Ph.D., *Professor of Christian Ethics*
 Robert Earl Cushman (1945), B.D., Ph.D., L.H.D., *Research Professor of Systematic Theology*
 William David Davies (1966), M.A., D.D., F.B.A., *George Washington Ivey Professor of Advanced Studies and Research in Christian Origins*
 James Michael Efrid (1962), B.D., Ph.D., *Associate Professor of Biblical Languages and Interpretation*
 Donn Michael Farris (1950), B.D., M.S. in L.S., *Professor of Theological Bibliography*
 Richard E. Gillespie (1971), B.D., *Instructor in Historical Theology*
 Richard A. Goodling (1959), B.D., Ph.D., *Professor of Pastoral Psychology*
 †Thor Hall (1962), B.D., M.R.E., Ph.D., *Associate Professor of Preaching and Theology*
 ‡Stuart C. Henry (1959), B.D., Ph.D., *Professor of American Christianity*
 Frederick Herzog (1960), Th.D., *Professor of Systematic Theology*
 Osmond Kelly Ingram (1959), B.D., *Professor of Parish Ministry*
 *William Arthur Kale (1952), B.D., D.D., *Professor of Christian Education*
 Creighton Lacy (1953), B.D., Ph.D., *Professor of World Christianity*
 Thomas A. Langford (1956), *Professor of Systematic Theology*
 Paul A. Mickey (1970), B.D., Th.D., *Assistant Professor of Pastoral Theology*
 Roland E. Murphy (1971), M.A., S.T.D., S.S.L., *Professor of Old Testament*
 §Ray C. Petry (1937), Ph.D., L.L.D., *James B. Duke Professor of Church History*
 McMurry S. Richey (1954), B.D., Ph.D., *Professor of Theology and Christian Nurture*
 Charles K. Robinson (1961), B.D., Ph.D., *Associate Professor of Philosophical Theology*
 *John Jesse Rudin, II (1945), B.D., A.M., Ph.D., *Associate Professor of Christian Communications*
 Dwight Moody Smith, Jr. (1965), B.D., M.A., Ph.D., *Professor of New Testament Interpretation*
 Harmon L. Smith (1962), B.D., Ph.D., *Associate Professor of Moral Theology*
 David Curtis Steinmetz (1971), B.D., Th.D., *Associate Professor of Church History and Doctrine*
 Robert L. Wilson (1970), B.D., M.A., Ph.D., *Research Professor of Church and Society*
 ||Franklin Woodrow Young (1968), B.D., Ph.D., *Amos Ragan Kearns Professor of New Testament and Patristic Studies*

Faculty, Department of Religion

(Teachers in graduate program in religion whose courses are open to Divinity School students.)

Professors

- David G. Bradley (1949), Ph.D.
 Robert Osborn (1954), B.D., Ph.D.
 William H. Poteat (1960), B.D., Ph.D.
 James L. Price (1952), B.D., Ph.D.

Associate Professors

- Henry B. Clark (1966), Ph.D.
 Wesley A. Kort (1965), Ph.D.
 Eric M. Meyers (1969), Ph.D.
 Harry B. Partin (1964), B.D., Ph.D.
 Orval Wintermute (1958), B.D., Ph.D.

*Sabbatical Leave, spring semester, 1973.

†Resignation effective August 31, 1972.

‡Sabbatical Leave, 1972-73.

§Retires August 31, 1972.

||Sabbatical Leave, fall semester 1972.

Assistant Professor

James H. Charlesworth (1969), B.D., Ph.D.

Associates in Instruction

P. Wesley Aitken (1953), B.D., Th.M., *Chaplain Supervisor, Duke Medical Center and Part-time Assistant Professor of Clinical Pastoral Education in the Divinity School*

John William Carlton (1969), B.D., Ph.D., *Adjunct Professor of Preaching*

Philip R. Cousin (1969), S.T.B., *Lecturer in Church and Society*

John C. Detwiler (1966), B.D., Th.M., *Chaplain Supervisor, Duke Medical Center, and Instructor in Clinical Pastoral Education*

John Kennedy Hanks (1954), M.A., *Lecturer in Sacred Music, Director of the Divinity School Choir, and Professor of Music, Duke University*

M. Wilson Nesbitt (1958), B.D., D.D., *Adjunct Professor of the Work of the Rural Church*

*William C. Spong (1965), B.D., Th.M., *Chaplain Supervisor, Duke Medical Center, and Instructor in Clinical Pastoral Education*

Emeriti

Kenneth Willis Clark (1931), B.D., Ph.D., D.D., *Professor Emeritus of New Testament and Co-Director of the International Greek New Testament Project*

James T. Cleland (1945), M.A., S.T.M., Th.D., D.D., *James B. Duke Professor Emeritus of Preaching*

Hiram Earl Myers (1926), S.T.M., D.D., *Professor Emeritus of Biblical Literature*

H. Shelton Smith (1931), Ph.D., D.D., Litt.D., *James B. Duke Professor Emeritus of American Religious Thought*

Hersey Everett Spence (1918), A.M., B.D., D.D., Litt.D., *Professor Emeritus of Religious Education*

William Franklin Stinespring (1936), M.A., Ph.D., *Professor Emeritus of Old Testament and Semitics*

Arley John Walton (1948), B.S.L., D.D., *Professor Emeritus of Church Administration and Director of Field Work*

Secretarial Staff

Lavon O. Buchanan, *Faculty Secretary*

Mary P. Chestnut, *Faculty Secretary*

Vivian P. Crumpler, *Faculty Secretary*

Ann C. Daniels, *Faculty Secretary*

Rose Marie Davis, A.B., *Secretary to the Director of Graduate Studies in Religion*

Clara S. Godwin, *Secretary to the Dean*

Patricia M. Haugg, *Faculty Secretary*

Maxie B. Honeycutt, *Administrative Secretary for Student Financial Aid*

Norma J. Johnson, *Faculty Secretary*

Anne B. Kellam, *Secretary to the Assistant Dean*

Joan F. Lunsford, *Secretary to the Assistant Dean*

Margie M. Meeler, *Secretary to the Director of Field Education*

Frances D. Parrish, *Secretary to the Director of the J. M. Ormond Center for Research, Planning and Development*

Divinity School Board of Visitors

Dr. Bernhard W. Anderson, Princeton, New Jersey

Mrs. Blanche Brian, Raleigh, North Carolina

Bishop William R. Cannon, Raleigh, North Carolina

Judge J. Braxton Craven, Jr., Asheville, North Carolina

Mr. Richard C. Erwin, Winston-Salem, North Carolina

Mrs. Doak Finch, Thomasville, North Carolina

*Resignation effective August 31, 1972.



The Reverend Ernest A. Fitzgerald, Winston-Salem, North Carolina
 Dr. James W. Fowler, III, Cambridge, Massachusetts
 The Reverend W. Wallace Friday, Columbia, South Carolina
 Bishop Kenneth Goodson, Birmingham, Alabama
 The Reverend Nicholas W. Grant, Raleigh, North Carolina
 Mr. William R. Henderson, High Point, North Carolina
 Bishop Earl G. Hunt, Jr., Charlotte, North Carolina
 Dr. Major J. Jones, Atlanta, Georgia
 The Reverend Dr. Frank Jordan, Lake Junaluska, North Carolina
 Dr. H. Burnell Pannill, Ashland, Virginia
 Dr. A. Craig Phillips, Raleigh, North Carolina
 Dr. James Roy Smith, Arlington, Virginia
 Mr. William E. Stevens, Jr., Lenoir, North Carolina
 The Reverend Eben Taylor, Anderson, South Carolina
 Dr. Norman L. Trott, Washington, D. C.
 Dr. Wilson O. Weldon, Chairman, Nashville, Tennessee

Councils and Committees

Faculty Executive Council

The Dean; Representatives: Beach, Goodling, M. Smith (2), Steinmetz; Members-at-Large: Bailey (3), Efird (1), Murphy (3), Richey (1), Wilson (2).

Administrative Committees

Academic Standing: The Dean, *ex officio*; Efird, Mickey; R. Young, *ex officio*.

Admissions: The Dean, R. Young, *ex officio*; Bailey, Bethea, Efird, Gillespie, Ingram. 2 Student Representatives.

Field Education: Wilson, Bethea, Goodling, Nesbitt, Shoaf, H. Smith. 1 Student Representative.

Continuing Education: Richey, Bethea, Ingram, Leonard, Nesbitt.

Library: Farris, *ex officio*; Gillespie, Herzog, M. Smith. 2 Student Representatives.

Ministerial and Professional Qualifications (Judiciary): R. Young, *ex officio*; Ingram, Mickey, Wilson. 3 Student Representatives.

Student Financial Aid: The Dean, *ex officio*; Bethea, Honeycutt, Nesbitt, O'Neal, Shoaf, Wilson, R. Young. 2 Student Consultants.

Educational Affairs Council

The Dean, *ex officio*; Representatives: Beach, Goodling, M. Smith (2), Steinmetz; Elected Members: Bailey (1), Lacy (1), Murphy (1), Robinson (1), H. Smith (1).

Academic Program Committees

Academic Advisers: Efird, *ex officio*; Mickey, Robinson, R. Young. 2 Student Representatives.

Honors Program Supervision: Murphy, Gillespie. 1 Student Representative.

Master of Theology Supervision: Beach, Goodling, Richey.

Joint and Special Committees

Chapel Worship: Mickey, Bethea, Carlton, Cousin, Ingram, Hanks, *ex officio*; Rudin, Worship Program Counselor. The Student Committee.

Divinity School Review: Robinson, Farris, Gillespie, Ingram, Murphy, M. Smith; 2 Student Representatives.

Lecture Program: Richey, Davies, Herzog, Lacy, H. Smith. 2 Student Representatives.

St. Michael's (Dumfries) Associates: H. Smith, Davies, R. Young. 1 Student Representative.

Social Concerns: Herzog, Lacy, Robinson.



1

General Information

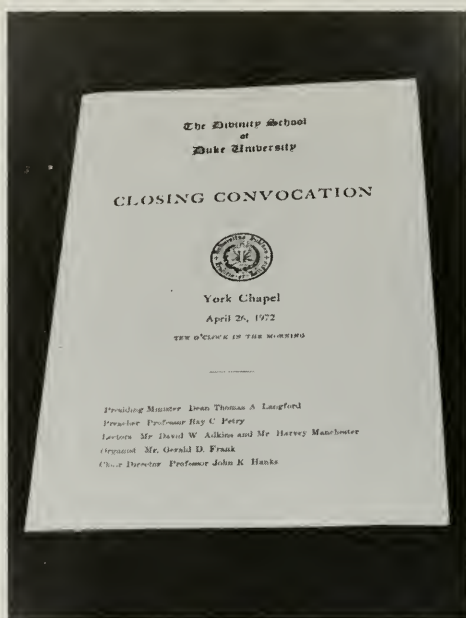
Historical Statement

The Indenture of Trust signed on December 11, 1924, by Mr. James B. Duke, which established Duke University, mentioned first among its objects the training of ministers of the Gospel. The Divinity School was, accordingly, the first of the graduate professional schools to be organized. Its work began in the year 1926-1927, with the formal opening exercises held on November 9, 1926.

The Reverend Doctor Edmund Davison Soper was the first Dean of the Divinity School. He resigned in 1928 to become President of Ohio Wesleyan University, and was succeeded by the Reverend Doctor Elbert Russell, who was then succeeded in 1941 by the Reverend Doctor Paul Neff Garber. In 1944, Dean Garber was elected to the episcopacy of The Methodist Church, and Doctor Harvie Branscomb assumed the duties of the Dean's office. In 1946, Dean Branscomb became Chancellor of Vanderbilt University, and in 1947 the Reverend Doctor Paul E. Root was elected Dean but died before he could assume office. The Reverend Doctor Harold A. Bosley became Dean in 1947 and resigned in 1950 to become the pastor of the First Methodist Church, Evanston, Illinois. The Reverend Doctor James Cannon was appointed Dean of the Divinity School March 1, 1951, and resigned the duties of the deanship September 30, 1958. The Reverend Doctor Robert Earl Cushman assumed the responsibilities of the office of Dean on October 1, 1958, and served until June, 1971. The Reverend Doctor Thomas A. Langford was elected to the Deanship and succeeded to the office on July 1, 1971.

The Role of the Divinity School

The Divinity School represents theological inquiry and learning within the greater University. By history and indenture, it stands squarely within the Christian



tradition and recognizes its distinctive lineage in, as well as continuing obligation toward, the United Methodist Church. It has been from its inception ecumenical in aspiration, teaching, and practice. Ecumenical also is the actual membership of its faculty. Educational policy has consistently aspired to nurture a Christian understanding "truly catholic, truly evangelical, and truly reformed."

The presiding purpose of the Divinity School is education for ministry. Ministry in Christ's name to the world increasingly assumes manifold forms. Provision for these variations of ministry is expressly supplied in the curricular resources of the School. However, while the conventional and inherited styles of ministry are now certainly undergoing change, the Divinity School curriculum continues to

prepare students for informed and discriminating discharge of the historic offices of church and congregation through the ministry of Word and Sacrament, pastoral care, and the teaching office. Whatever form or context “the local church” of tomorrow may assume, Divinity School education remains predicated upon the historically grounded probability that these offices will remain.

Under the guidance of this perspective, the Divinity School aspires to prepare adequately qualified students for mature espousal of their vocation, with disciplined intelligence informed by sound learning, and equipped for worthy professional service. This is regarded as a service to the Church, to the world, and pre-eminently, to the Lord of the Church.

The Relation of the Divinity School to Duke University

The Divinity School is an integral part of the University and shares fully in its activities, privileges, and responsibilities. The Sunday services in the University Chapel give Divinity School students an opportunity to hear each year a number of leading ministers of the country. The University libraries make a rich collection of more than 2,300,000 volumes easily accessible. Selected courses in the Graduate School and in the professional schools are open to Divinity School students without payment of additional fees. The general, cultural, and recreational resources of the University are available to them on the same basis as to other students.

Education for Ministry

The Divinity School, although United Methodist in tradition and dependency, receives students from many Christian denominations and offers its educational resources to selected representatives of the several communions who seek education for a church-related ministry. The aim of the school is not general but professional education for a Christian ministry. Its resources are offered to qualified students with vocational aims commensurate with those of the School. Although the student body is one of diversity of ministerial aims, the School seeks by recruitment and financial support to be responsive to the major continuing needs for the sound preparation of persons for ordination or lay professional vocations of the churches.



2

Program Information

Degree Programs

The academic work of the Divinity School embraces three degree programs. These are the basic degree programs ordinarily of three academic years, leading to the Master of Divinity degree (M.Div.); a one-year program beyond the basic degree, the Master of Theology (Th.M.); and a third program of two academic years leading to the degree of Master of Religious Education (M.R.E.). All are graduate-professional degrees. Admission to candidacy for the Master of Divinity and Master of Religious Education degrees presupposes the completion of the A.B. or its equivalent.

Students preparing for ordination to the Christian ministry, and requiring appropriate graduate-professional education, will regularly enroll for the Master of Divinity degree. Students whose acquired academic standing, under this basic degree program, entitles them to further specialized study may advance their command of selected theological disciplines by applying for an additional year of studies leading to the Master of Theology degree. Together, these two degree programs constitute a sequence. Although the Master of Divinity degree fulfills requirements for ordination by prevailing ecclesiastical standards, the Th.M. program may assist in assuring a larger measure of professional preparation. Application for admission to the Th.M. program is open to graduates of other schools who have completed the basic theological degree.

The Master of Religious Education degree program is designed to prepare qualified persons, ordinarily not seeking ordination, for a ministry of Christian education in local churches or other contexts. The course of study is arranged to provide grounding in Biblical, historical, and theological disciplines as essential background for instruction in and exercise of professional competence in curricular planning, teaching methods, and supervision of educational programs for various age groups.

The specific requirements for each of these degrees are found in the succeeding pages. It is evident that completed course work cannot be credited toward more than one degree. Reciprocal transfer of credit for course work taken under either the M.Div. or the M.R.E. program requires the permission of the Dean.

Doctoral Studies Accredited by the Graduate School

The Divinity School provides a substantial body of course offerings at an advanced level in Biblical, historical, and systematic and contemporary theological disciplines that are accredited alike by the Graduate School and the faculty of the Divinity School, and lead to the Doctor of Philosophy degree. Sharing responsibility with the University Department of Religion for staffing and curricular provision of this course of study, the Divinity School is the principal contributor to the program of graduate studies in religion. However, since the Ph.D. in religion is certified and awarded under the Graduate School, the doctoral student's admission and matriculation are administered under that division of Duke University.

With few exceptions, most courses in the *Bulletin of the Divinity School* carrying a 200 number or above and belonging to the fields noted above are applicable to doctoral programs of study.

Qualified persons who desire to pursue studies leading to the degrees of M.A. or Ph.D. in religion, under the administration of the Graduate School, are advised to apply to the Dean of that School. Inquiries concerning fellowships or specific requirements of the Program of Graduate Studies in Religion may be addressed to Professor Franklin W. Young, Director, 209 Divinity School.

The Basic Theological Degree—Master of Divinity

Recent Curricular Revision. In 1948 a greatly altered curriculum, providing for both vocational differentiation and area concentration in student programs, was introduced and was in force until 1959 when further alterations and articulations of that program was instituted.

Recently, after extensive study, a revised curriculum leading to the basic theological degree was provisionally instituted in the fall of 1967 as subject to further emendations. It was published in the 1968 *Bulletin*. Thereafter, an authorized committee of the faculty, pursuing certain lines of the 1967 program, but empowered to raise prior questions concerning the aims and goals of timely theological education in a university context, submitted its preliminary report in the fall of 1968 to the faculty and the authorized committee of the Co-ordinating Council for scrutiny and suggestions. After full assessment of the bearing of all commentary criticism, the presently offered program of studies leading to the Master of Divinity degree was adopted by faculty action January 22, 1969, and is herewith published. Under this program, and until it may be further altered by due process, students matriculating for the Master of Divinity degree at Duke University are expected, as a condition of admission, to formulate and pursue their theological education.

Having undertaken and effected major curricular alteration and updating four times in two decades, the Divinity School and its faculty believes it has shown itself not insensitive to the need for change in a changing society. It is now the judgment of the faculty and the Dean that any curriculum is only a more or less adequate vehicle of unavoidably multiple educational purposes that are not fully capable of harmonization, and that, in the end, fruitful education must depend upon student and faculty mutuality, utilization of resources, diligent application, and positive motivation, as well as good will.

The currently published basic degree program is, in sum, the resultant of earnest and searching consultation and inquiry extending through the years 1965-1969. New directions of critical reflection represented by the Bridston-Culver report, the Feilding Report, the AATS Task Force recommendations, the Sewanee

Consultation, together with attention to numerous developments in sister institutions, have strongly contributed to the present curricular program. It seeks to be a positive response to (1) the challenge to provide an adequate professional education, education for ministry; (2) needed variability of ministries in today's world; (3) the norms of university education; and (4) the perennial summons of the abiding Christian tradition.

Finally, the basic degree program became effective in the fall semester, 1969, for all students other than seniors graduating in June, 1970.

Aims of the Curriculum. The aims of the basic degree program focus upon four goals, four areas of personal and curricular responsibility also deemed to be four life-long tasks which should be strongly advanced during the seminary years.

1. The Christian Tradition. To acquire a basic understanding of the Biblical, historical, and theological heritage.

2. Self-Understanding. To progress in personal and professional maturity—personal identity, life style as an instrument of ministry, major drives, handling of conflict, resources, professional competency, and so forth. This is to be coupled with a sensitivity to the world in which we minister—its social forces, its power structures, its potential for humanization and de-humanization.

3. Thinking Theologically. To have the ability to reflect about major theological and social issues and to define current issues in theological terms and theological issues in contemporary secular terms.

4. Ministering-in-Context. To have the ability to conceptualize and participate effectively in some contemporary ministry.

Obviously goals of such scope cannot be neatly programmed in any curriculum, and the degree of achievement (in seminary and beyond) will vary widely with the individual and his own motives and incentives.

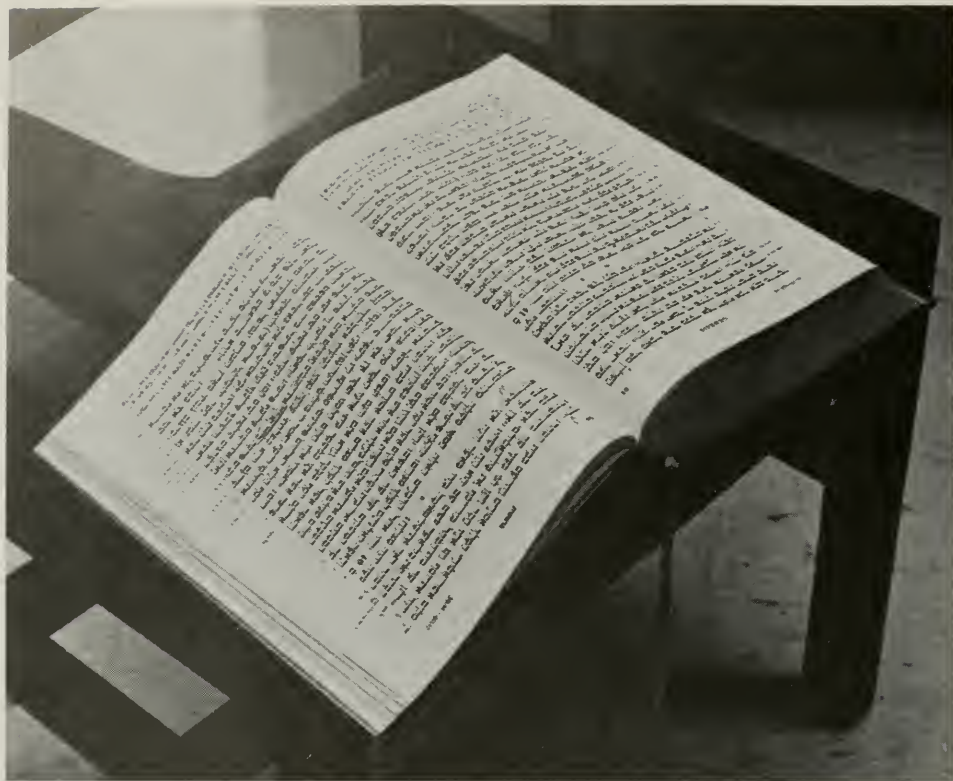
The Basic Curriculum—General Description. The basic curriculum leading to the Master of Divinity degree provides for foundational courses in Biblical, historical, theological, and ministry studies, representative of the tradition and regarded as indispensable background for subsequent elective work and individual program formation.

These required courses total 23 of the 75 semester hours necessary for graduation. The opportunity of advanced standing adds further variability to the academic program of the junior student, depending upon the nature and quality of his undergraduate academic work.

Required courses may be staffed by one or more professors and are planned to treat the subject matter both in scope and depth at the graduate level.

Especially designed courses for entering students of the junior year in the area of Church and Ministry offer experience in group learning and are strongly recommended. These courses are introductory to various aspects of the work of the Church and its ministry in relation to altering societal contexts. Registration information materials list these course offerings as a group for the selection of entering students.

One elective course is available in each semester of the junior year and may be utilized for language study in either Greek or Hebrew or another Biblical language as the student may be qualified. A total of 50 semester hours are available for working out the students' individualized program of studies leading to specialized preparation in academic depth and for purposes of professional ministerial competence.



The formulation of the student's course of studies is guided by certain broad but normative recommendations for area distribution of courses and by the advice and counsel of appointed faculty advisers or authorized directors.

Students and advisers are directed to read diligently the paragraphs on elective studies and professional aims and distribution of elective studies of the section entitled Administration of the Curriculum.

All academic programs are subject to review and emendation of the Dean and Registration Committee for the fulfillment of the aims of the curriculum. The declared vocational and professional objective of the student is of central importance both to the student and his faculty adviser in planning the student's comprehensive study program.

Six semesters of residential study are ordinarily required for the completion of the degree. On permission of the Dean certified nonresidential study, not exceeding the equivalent of 24 semester hours, may be permitted to a candidate for the basic degree.

The normal course load per semester is 12 or 13 semester hours. A student with demonstrated competence may, with the consent of his academic adviser and the chairman of the Registration Committee, enroll for an additional 2- and 3-hour course in the middler and senior years. However, it is expressly noted here that the delimitation of the semester course-hour load and the total credit hour requirement for graduation entitles both student and instructor to expectations of substantial student investment and accomplishment in individual courses. The emphasis of the new curriculum, like that of the preceding one, is upon depth and competence rather than upon excessive scope.

General Features of the Basic Curriculum. The following is a brief summary of the basic curriculum.

A total requirement of 75 semester hours for graduation.

A normal academic load of four courses with credit.

Professionally oriented courses for entering students in the fall semester of the junior year in the area of Church and Ministry.

Special allowances: up to 3 semester hours of credit for Field Education projects under faculty supervision; up to 6 semester hours credit for independent study; up to 6 semester hours clinical or internship credit; ordinarily up to 6 semester hours of cognate studies of graduate standing in Duke University, with the advice of the student's academic adviser and the Dean. Enrollment for cognate graduate study outside the University requires the approval of the Dean. This includes studies abroad.

MASTER SCHEDULE

The Curricular Paradigm†

Junior Year

<i>Fall Semester</i>	<i>s.h.</i>	<i>Spring Semester</i>	<i>s.h.</i>
Old Testament 11 (or OT elective) for advanced standing)	4	New Testament 18 (or NT elective for advanced standing)	4
Church History 13 (or CH or HT elective for advanced standing)	3	Church History 14 (or CH or HT elective for advanced standing)	3
Church and Ministry	2 or 3*	Elective	2 or 3*
Elective	3	Elective	3
Total	13 or 14	Total	13 or 14

Middler Year

<i>Fall Semester</i>	<i>s.h.</i>	<i>Spring Semester</i>	<i>s.h.</i>
Systematic Theology 32	4	Christian Ethics Introduction 33	3
American Christianity 28	3	Elective	3
Elective	3	Elective	3
Elective	3	Elective	3
Total	13	Total	12

*Optional.

†Senior year—Elective courses, 12 s.h. fall and spring.

The Honors Program of the Basic Curriculum

Effective in the fall semester, 1969, a new Honors Program replaced the honors programs of former years.

The program requires 75 semester hours credit leading to the Master of Divinity degree. It is open to students admitted to the regular course of study who, in virtue of superior undergraduate record and achievement, give promise of capacity for more rapid advancement toward independent utilization of the resources of curriculum, library, and faculty supervision.

Admission Procedures. A student applying for admission to the Divinity School may apply at the same time for admission to the Honors Program. Pro-

cedures and requirements are as follows: (1) The student must submit a *B+* or better undergraduate record. (2) His application will be reviewed by the Faculty Committee on Honors. This committee may require the student to have an interview, if necessary, at the time of fall matriculation. (3) He must submit with the application his scores on the Graduate Record Examination or other comparable test scores as the committee may request.

Notice of the action of the committee will not necessarily be coincident with notice of admission to the Divinity School, since two different committee actions are involved and because of the special procedures involving honors applicants noted above. However, with submission of all required credentials, and barring the need of an interview, of which the student would be formally notified, the Honors Program Committee will give notice of action not later than April 15 for applicants who have submitted all credentials prior to March 15. Late applications will be acted upon as promptly as possible.

Admission to the Honors Program at the end of the junior year is provided for and will be contingent upon superior performance in course work (ordinarily at least a *B+* average) and the approval by the Honors Program Committee. Applicants completing their course work of the junior year will apply to the Honors Program Committee, through the admissions officer, not later than July 1 preceding their middler year.

Synopsis of the Honors Program. The junior honors student's program follows the regular academic program for the first and second semesters of residence in the Divinity School.

In the first semester of the middler year, the student registers for the required course in Systematic Theology and at least one elective. In the second semester, the student registers for at least two courses, one of which must be Christian Ethics Introduction (unless he had been granted advanced standing in ethics), with a minimum of 6 semester hours.

Honors students will employ free time allowed by their schedule for the purpose of independent study in the area of their chosen concentration. The honors student may register for up to 6 hours each semester for Independent Study (399.5), in preparation for the comprehensive examination, but the total number of semester hours of credit should normally be limited to 12. He is encouraged, however, to consider, in consultation with his Divisional Honors Adviser, such advanced courses or seminars as will contribute to his area of chosen concentration. At a date set by the Committee on Honors, students stand for a comprehensive examination in a defined area representative of the extent and focus of their independent study. Divisional representatives of the faculty will supply honors students, upon their admission to the program, with bibliography and advice regarding the limits, requirements, and standards of the comprehensive.

In each semester of the senior year, the student must register for at least one advanced course or seminar in the field of his concentration. The honors student may register for up to 9 hours each semester for Independent Study (399.6) working toward the senior honors paper, but the total number of semester hours of credit should normally be limited to 12. Before April 15 of his last semester (or December 15 if his sixth semester falls in the autumn term) the student presents an honors paper on a subject appropriate to his area of concentration.

Provisions for advanced standing and for "reading out courses" apply to honors students where appropriate.

Field Education requirements of the regular program apply to students in honors studies. Honors students may in their middler and senior years enroll in

regular curricular offerings of the Divinity School, and they may participate in Field Education enterprises. They may also enroll for up to 6 semester hours of cognate studies, additional to designated electives, in the Graduate School of Duke University, with the permission of their adviser and the Honors Program Supervisor.

Administration of the Program. The honors student will be assigned to a faculty member of the Honors Committee with whom consultation will be imperative. This adviser, from the student's chosen division, will serve as his academic adviser for registration each semester. The student's program of studies is subject to review by the Honors Program Committee at the end of each semester to determine his eligibility for continuation in the program. His prospective course of study for each succeeding semester requires the approval of both his faculty adviser and the Supervisor of the Honors Program.

Students in the Honors Program are not required to complete their degrees in three academic years, but they must fulfill at least six semesters of academic residence.

If the faculty of the chosen division so determines, a colloquium for periodic discussion of pertinent issues in the field will be arranged. If such a colloquium is scheduled, requirements for the Honors Program shall include regular attendance at such sessions, although no academic credit will be assigned to such meetings.

Transcripts and Grades. When it becomes necessary to supply a transcript of grades for honors study, the student will be credited with the registered number of hours of Independent Study (399.5 and 399.6) in the divisional fields corresponding to his focus of study. Grades for independent study (adjudged on the basis of the comprehensive examination for middlers and the honors paper for seniors) will be recorded as *A* when he has, in the judgment of the instructor, performed with distinction or, otherwise, as *P*. Grades for other courses will be recorded and transcribed in the routine manner. If at any time a student falls below an acceptable level of performance in the Honors Program, he will be advised to return to study in the regular curriculum. In such case he will receive credit for the number of hours which he would normally have acquired at that chronological point in his career had he pursued the normal course of study. Hours will be assigned to divisional areas which correspond to the areas of his independent study. Grades for these hours will be determined by the Honors Committee upon the recommendation of his adviser.

Administration of the Curriculum

General Regulations. The following regulations pertain to students enrolled in the regular curriculum:

1. Full-time students are required to enroll for the required courses of the curriculum or for alternative courses offered for advanced standing in the order provided by the master schedule of the curricular paradigm.

2. Students in programs leading to either the Master of Divinity or Master of Religious Education degree are required at the time of each registration period to plan their course of study with consultation and approval of their assigned faculty advisers. Such programs are subject to review and approval of the Committee on Academic Standing or the Dean.

3. Student Pastors in candidacy for the Master of Divinity degree under any of the three programs of study are advised that their program will normally re-

quire a fourth academic year. Modification of this schedule of expectancy will be treated with reserve and will require the express approval of the Dean on recommendation of the Director of Field Education.

a. Students with pastoral charges, or comparable extracurricular responsibilities, will normally enroll for not less than 7 semester hours.

b. An entering student desiring to serve as a student pastor must have the approval of the Director of Field Education and must participate in an Orientation and Training Program (see Field Education, page 41).

c. Students who accept pastoral charges in their middler or senior years are required to have the prior approval of the Director of Field Education. Such students will be required to restrict their course work in accordance with the regulation 3a stated above, governing the course load of all student pastors-in-charge.

d. Modifications of these regulations, in the case of individual student pastors, will be scrupulously administered in terms of location of charge and commuting distance, magnitude of assignment, and residence during the academic week. Demonstrated academic achievement will regularly condition any modification of the normal limitation. Since adequate indication of the student's academic proficiency will not be available before the completion of the first academic year, no modification of regulation 3a for junior students is allowed.

4. Student Assistant Pastors (not pastors-in-charge) may enroll for a full academic load providing they are not on probation, are under the supervision of the Director of Field Education, and possess field duties involving no more than 15 hours per week.

5. A student in candidacy for the Master of Divinity or Master of Religious Education degree shall enroll for no less than 7 semester hours in any semester. Variations from this regulation shall be by approval of the Dean.

6. Study abroad, with transferable credit toward graduation, may be allowed for a candidate for the Master of Divinity degree by approval of the Dean on recommendation of the Assistant Dean. Permission will not be granted in the absence of a strong academic record. Ordinarily, permission for such study may be granted to students who have completed the work of the middler year. Both the institution abroad and a specific course of study proposed must have the prior approval of the chairman of the Registration Committee and the Dean.

7. Transfer of credit to the Divinity School of Duke University, leading to candidacy for the degree of Master of Divinity, ordinarily may not exceed in amount more than one-half of the academic credits (in proportional evaluation) required for fulfillment of degree candidacy (see chapter on Admission, page 35).

8. Special student status may be granted on recommendation of the admissions officer for approval of the Dean. Particular circumstances must prevail in the case of such admissions and will not be honored to permit circumvention of requirements of regular academic programs. Special students are not eligible for tuition or other scholarship grants.

9. Auditing of courses is permitted on notice to the Registrar and by permission of the Dean and the faculty instructor concerned. Auditors, not in regular course of study as candidates for degrees, are subject to a \$32.50 fee by University regulations.

10. Students in candidacy for a degree who secure minor employment outside the channels of the Field Education Office are required to inform the Director of Field Education. Students carrying an outside employment work load of more than 15 hours weekly may be required to limit their academic load.

Curricular Provisions and Procedures. Admission to candidacy for the



Master of Divinity degree is admission to the regular program of studies. The master schedule constitutes the prospectus for the basic theological degree. The prospectus defines the normal sequence of the student's developing program. Variations of sequence are excluded except in the instance of students on limited programs, as in the case of student pastors, arranging their studies over four years, or special students.

Students who matriculate for the second semester of the junior year in January will be responsible for fulfilling requirements of the first semester of the junior year the succeeding fall semester.

The rationale and conditions of advanced standing are provided in the section entitled Admissions. The provision is, in principle, applicable exclusively to required courses.

Students qualifying for advanced standing in History of Christianity, I, II, III (13 and 14) which is a year course will fulfill the requirements by electing three courses in historical studies, with the consent of their faculty advisers. Advanced

standing is not applicable to the Introduction to Christian Theology (CT 32). Waiver of this rule will require satisfactory performance on a prescribed written examination. The principle of advanced standing may, on concurrence of the faculty adviser and the course instructor, be applied to distinctly introductory courses which a student elects.

Students offered advanced standing at the time of matriculation may, after consultation with their faculty advisers, decline such standing and enroll in the required course.

A summary of advanced standing options will be available at the time of registration for required courses.

A student entering the Divinity School with undergraduate preparation in Greek may elect to continue his studies in New Testament Greek at an advanced level. A junior student desiring to begin the study of New Testament Greek may elect Hellenistic Greek 103-104.

A student with advanced standing in New Testament may elect six semester hours of New Testament Greek as his advanced option in lieu of the basic required course.

The curriculum intends to serve graduate-professional aims with maximum flexibility. Fifty (50) elective course hours are available for proper ordering and programming to serve the ends of vocational and professional incentives. This latitude manifestly lays heavy responsibility upon the student to see that he submits himself to those disciplines that most suitably prepare him for his ministerial service.

In planning his course of study, therefore, he must, in consultation with his faculty adviser, shape his course program by enlarging understanding of his eventual professional responsibilities. To this end he may need to consult several members of the faculty and staff for guidance.

Professional ministries include those of the parish, preaching, teaching, and pastoral care; ministries of education in local churches and higher education; missions; campus ministry; specialized urban and rural ministries; chaplaincies—hospital, institutional, industrial, and military; teaching; religious journalism; audio-visual communications; church agencies; and ecumenical ministries at home and abroad. For many of these the curriculum is inadequate and further specialized training will necessarily be sought elsewhere beyond the basic degree. For all of these ministries the student's program of studies can be shaped to be foundational and purposeful for the particular ministry in view.

Students are encouraged to elect one course in each of the following areas or subdivisions of the curriculum beyond provisions supplied by any required courses, and to be selected with a view to the individual student's vocational and professional aims:

American Christianity
History of Religion
Christian Education
World Christianity and
Ecumenics

Biblical Exegesis
Pastoral Psychology
Christian Ethics
Worship and Preaching
Care of the Parish (including Church
and Community)

On the other hand, students are also encouraged to concentrate, ordinarily in not more than five advanced courses in any one subdivision of the curriculum, in an area directly supportive of and related to their vocational and professional intention.

Marked variations from these advisory guidelines will render the student's program admissible of review and revision by action of the faculty adviser, the Committee on Academic Advisers, or the Dean.

Each student is required to complete one *approved* assignment in field education (with or without remuneration) under supervision.

Such assignments might include an internship, a summer of full-time work, two semesters of part-time work, or involvement in church or community service. The essential criteria for graduation credit would be that the amount and quality of supervision be approved by the Field Education Office, and that the student be required to evaluate and correlate the experience directly or through his Ministering-in-Context.

Ministering-in-Context Program. Ministering-in-Context is an interdisciplinary program with the purpose of providing a means for senior-level students to summarize and integrate their understanding of Christian ministry through reflection upon contextual experience under interdivisional faculty guidance. It is presently available as an elective option to students in the regular course of study. Students in the Honors Program are not eligible.

The Ministering-in-Context project is initiated in the spring of the middler year and extends over both semesters of the senior year. It carries a total of six semester hours of credit. The purpose of Ministering-in-Context is to provide continuity between ministry today and the preparation for it, by assisting each student to (a) utilize interdisciplinary resources in understanding the personal and social issues of today's world; (b) identify individual forms of ministry and to match his own personal resources with the plurality of demands put upon him; (c) develop a professional role appropriate to traditional and experimental ministries; (d) test competence and readiness for ministry; and (e) develop the student's ability to provide conditions whereby a vital church and a meaningful ministry may come into being through his training, insight, and commitment.

***SCHEDULE**

Middler-Spring

Students submit applications to Registrar's Office not later than March 1.
Program prospectus submitted by student to faculty guidance committee not later than April 1.

Senior-Fall

Consultations of students and faculty guidance committee for definition of project and series of progress reports.

Senior-Midyear

March and April: Students meet with their committee for evaluation of project papers.

May: Deadline of project papers, May 10.

Ordination and Disciplinary Requirements. Students preparing for ordination are strongly advised to fulfill denominational requirements for study of church polity. United Methodist students must attend to regulations of the *Discipline*, paragraph 344. Introduction to Christian Theology (C.T. 32) has been certified for the Disciplinary requirement in United Methodist doctrine.

Graduation Credits. It is the responsibility of each student to see that he meets all requirements for graduation; and to take his courses in proper sequence.

***This schedule may be amended.**

He is also responsible for seeing that any special permission granted him to deviate from the normal program is properly recorded in his personal files.

Grading System. As of the academic year 1971-72, the Divinity School employs the grading scale with the following letters *A, B, C, D*, and *F* which have been defined as follows: *A*, Excellent; *B*, Superior; *C*, Average; *D*, Passing; *F*, Failure; *WP*, Withdrew Passing; *WF*, Withdrew Failing; *WI*, Withdrew Illness; *W*, Withdrew, discretion of the dean; *I*, Incomplete; *P*, Passed; *N.C.*, Non-credit; *Z*, Year course.

The denotations are defined as follows according to quality points *A*, 4; *A—*, 3.7; *B+*, 3.3; *B*, 3.0; *B—*, 2.7; *C+*, 2.3; *C*, 2.0; *C—*, 1.7; *D+*, 1.3; *D*, 1.0; *D—*, 1.0; *F*, 0.

In all courses where the instructor considers attendance a necessary part of the work of the course, a student may not receive a grade of over *C* if his absences total 12 percent of the regular class periods, and if the absences total 24 percent of the class periods he may not receive credit for the course.

Incompletes. A student may petition the Assistant Dean to receive a grade of incomplete in a course. This petition must be filed in writing on the prescribed form with the Assistant Dean on or before the last official day of classes of the semester in question. Such permission may be granted when a student, through some circumstances beyond his control, such as illness, has been hindered from meeting the course requirements. Adjudication of the petition will rest jointly with the Assistant Dean and the instructor concerned. The Assistant Dean will communicate in writing with the student regarding the joint decision and any conditions attached thereto. An incomplete becomes an *F* unless it is removed through completion of assigned work by the following dates:

for incompletes incurred in fall semester courses, March 1.

for incompletes incurred in spring semester courses, October 10.

Change of Course or Withdrawal. A student is permitted to change his registration for course work without incurring a penalty no later than completion of the second meeting of the course from which he desires to withdraw or, correspondingly, of the course to which he seeks admission.

No student shall be permitted to drop a course after the expiration of one-third of the period of instruction of the course without incurring failure, except for causes adjudged by the Assistant Dean to be beyond the student's control. Conditions of emergency and not considerations of convenience shall be regarded as determinative in considering requests.

Graduation with Distinction. Students who achieve a grade point average of 3.85 for overall academic records in the Divinity School are granted the degree of Master of Divinity, Master of Theology, and Master of Religious Education, *summa cum laude*. Students with a grade point average of 3.65 are awarded such degrees, *magna cum laude*. Such distinction is specified on their diplomas.

The Master of Religious Education Degree

The course of study leading to this degree is designed for persons desiring to prepare for leadership and service in the educational ministry of the church.

Admission. Applications for admission to the Master of Religious Education program are evaluated by the same standards as those applicable to the Master

of Divinity degree and admission requirements and procedures are also the same. Students planning to specialize in Christian Education should study carefully those sections of this *Bulletin* which contain statements of policy regarding the most appropriate prerequisite studies for theological education and the procedures to be followed in applying for admission.

Requirements. The Master of Religious Education degree normally requires two years, or four semesters, of residence and study and the fulfillment of the following requirements:

1. Sixteen courses selected by the candidate in consultation with the Director of the program, or his representative, twelve of them limited electives and four free electives.

2. Field project, supervised by the Director of the program, with final oral examination by committee.

3. Weekly conferences of candidates with the Director of the program or another resource person. (Required in the first semester of the first year, and arranged in later semesters according to the student's interests and needs).

A candidate having an academic average of *B* or better in undergraduate studies may be permitted to "read out" in a maximum of two courses, usually the Director of the program and the instructor(s) involved. A student not approved scheduled one in each year, provided application for this privilege is approved by for "reading out" in the first year may qualify for this privilege in one course in the second year on the basis of a *B* or better average in the first year.

PROGRAM OF STUDY FOR M.R.E. DEGREE

Limited electives*	12
Two courses in the Biblical Division	
Two courses in the Historical Division	
Two courses in the Theological Division	
Two courses in the Ministerial Division	
(other than Christian Education)	
Four courses in Christian Education	
Free electives†	3
Cognate courses in another department†	1
	<hr/>
	16
Weekly conferences of candidates (Required in fall semester, first year)	
Field project (Required of all candidates and usually scheduled in fall semester of second year)	

The Master of Theology Degree

The course of study leading to the degree of Master of Theology is designed for graduates of accredited theological schools who desire to continue or resume their theological education for enhancement of professional competence in selected areas

*Limited electives may be completed through tutorials, if approved by the Director of the program and the instructor(s) involved, provided the total number of tutorials is ordinarily no more than 2.

†Free electives and cognate courses must be chosen by the student in consultation with the Director of the program and subject to the approval of the Educational Affairs Council.

of study. Enrollment in the Th.M. degree program is open to a limited number of students who have received the M.Div. (or the equivalent) with superior academic records.

Admission inquiries may be addressed to the Assistant Dean for referral to the Director of the Th.M. program.

General Requirements. The general requirements for the degree of Master of Theology are:

1. Twenty-four semester hours of advanced studies, with an average grade of *B* (3.00 average on a 4.00 scale).

2. Superior performance in a comprehensive examination covering the major area of study. As an alternative to the comprehensive examination the student may elect to do a research project in his major area if approved by supervising professor. This project shall carry 3 s.h. credit, to be counted within the twenty-four hours required.

3. Residence for one academic year.

There are no general language requirements, except that classical or modern languages may be required for certain programs (for example, in Biblical studies, Hebrew or Greek may be required).

The Program of Study. At least 12 of the required 24 hours must be taken in one of the basic divisions of study (Biblical, historical, theological, or ministerial) which shall be designated as the candidate's major, and at least 6 hours in another of the divisions which shall be designated as the candidate's minor. No more than 6 semester hours of work completed in another accredited institution may be transferred and credited toward the degree. Ordinarily, no more than 6 hours may be taken through directed reading, and no more than 3 in any one semester. In the area of pastoral psychology, up to 12 hours may be taken through clinical pastoral education.

The comprehensive examination will be given at the close of the course of study for the degree, ordinarily in May or September.

The entire program of studies and comprehensive examination should be completed within twelve months. In some cases, the time limit may be extended, but in no case beyond three years.

The candidate majoring in pastoral psychology may plan one of three programs or concentrations: a concentration in pastoral theology relating psychology and theological understanding to professional ministry, especially the parish, through coursework and supervised clinical experience; a concentration in pastoral care through coursework and an intern year in Basic Clinical Pastoral Education; a concentration in pastoral counseling through coursework and a year of Advanced Clinical Pastoral Education. In the context of clinical pastoral education various professional goals may be sought, including general understanding and skills in pastoral care and specialization in pastoral counseling and clinical supervision. The Clinical Pastoral Education Program is certified by the Association for Clinical Pastoral Education. Persons specializing in pastoral counseling will be moved toward certification with the American Association of Pastoral Counselors. Course PP 277A (or its equivalent) is considered a prerequisite for a major in pastoral psychology. (The 4 semester hours of credit are not applicable toward the 24 hours required for the degree, although the course will be indicated on the student's transcript). Accordingly, the student majoring in this area should ordinarily make provision for a program extending for a full calendar year beginning the first week in June.



Financial Aid. Candidates for the Th.M. degree are eligible for financial aid on the same basis as all regularly enrolled Divinity School students.

Please note in the pertinent sections of the chapter on Financial Information that the charges for tuition and general fee for the Th.M. degree are combined and are made on the basis of the number of semester hours taken, and that in order to be eligible for medical and surgical care a student must be taking at least seven hours.

Conduct of Students

Duke University expects and will require of all its students continuing loyal cooperation in developing and maintaining high standards of scholarship and conduct.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate, for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University.



3

Community Life

Living Accommodations

Housing. Duke University provides residence hall and apartment accommodations for single graduate and professional school men and women. Since no married student housing facilities are presently available, the University provides assistance to married graduate and professional students in locating suitable housing in Durham where varied types of living units are reasonably available.

The Graduate Center, near the Medical Center, and Town House Apartments houses men and women enrolled on a full-time basis in the Graduate and professional schools. Town House Apartments are located between East and West Campuses.

The Graduate Center houses 189 male graduate students, 56 female graduate students, and 117 female undergraduate students. Common facilities on the main floor are shared by men and women.

Students are normally licensed to occupy graduate residential space for the academic year, but for no period less than a semester or specified term.

Duke University operates Town House Apartments primarily for graduate and professional students. Others are housed in individual apartments if the interests of the University are served. There are 30 two-bedroom units, each furnished for three occupants. Two students occupy the master bedroom with adjoining half-bath, and the third occupies a smaller bedroom. A living room, kitchen, and full bath complete the living arrangement. Additional features are air-conditioning and a swimming pool. The campus bus, serving all parts of the University, is accessible to the Town House Apartments.

The Department of Housing Management is prepared to assist married graduate and professional school students in locating suitable housing in Durham. There are many relatively new complexes and a few older apartments. Houses and duplex units are available in limited numbers from time to time.



Detailed information about University housing facilities for single students, and the housing assistance program for married students, will be provided upon request by the Department of Housing Management, Duke University, Duke Station, Durham, North Carolina 27706.

Rooms in residence halls and spaces in the Town House Apartments or other rental units may be reserved by applicants only if they have been accepted by the Graduate School, and after the required \$50.00 residential deposit has been paid to the University. The initial residential deposit is required with the application and is held until the room or apartment is vacated. Application forms and detailed information on graduate housing will be mailed when the Graduate School has notified the Department of Housing Management of official acceptance of the student. Single students may express a choice for the type of housing desired. Completed applications for rooms and apartments are to be returned with required deposits, to the Department of Housing Management, Duke Station, Duke University, Durham, North Carolina 27706. Assignment priority is established by the date of receipt of completed applications with deposits in this office.

Regulations governing occupancy of rooms and apartments will be provided by the Department of Housing Management at the time application forms are forwarded to accepted students. Occupants within each type of housing are expected to comply with the appropriate regulations.

For the cost of housing, see the section on Financial Information.

Food Services. Food service on both East and West Campus is cafeteria style. The dining facilities on the West Campus include one straight-line cafeteria with multiple-choice menus, a free-flow service area which includes cafeteria counters as well as a grill, and a table service dining room, The Oak Room, where full meals and *a la carte* items are served. The Cambridge Inn, which is

a self-service snack bar also located in the West Campus Union, is open from 9:00 a.m. until 12:30 a.m. each day except Saturday. All types of snack and sandwich items are available here. The Graduate Center has a cafeteria open at meal hours, and a coffee lounge which is open until 11:00 p.m. Because of the large number of those served in the dining halls, it is not possible to arrange special diets for individual students.

The cost of meals approximates \$2.50 to \$3.25 per day, depending upon the needs and tastes of the individual.

Student and Professional Organizations

Divinity School Choir. A student organization of long standing is the Divinity School Choir. Membership in the Choir is open to all qualified students. The Choir sings regularly for chapel and at special seasonal programs and services. New members are chosen by informal auditions held during the first week of fall classes. Auditions are arranged for all who are interested.

The Student Association. The officers of the Student Association are elected and serve as an executive committee for conduct of the business of the Representative Assembly. The *Directory* of the Divinity School annually carries information relating to the structure and function and the roster of student representatives, elected or *ex officio*.

The purpose of the Association is to channel the interests and concerns of Divinity School students to the following ends:

1. To provide student programs and activities;
2. To represent students to the faculty and administration;
3. To represent students with other university organizations; and
4. To represent students in extra-University affairs.

Divinity Dames. Divinity Dames is an organization of wives and women students in the Divinity School which offers opportunities for sharing interests and concerns. The Dames program, which includes a variety of speakers, small interest groups, and special projects, seeks to encourage and provide ways for wives to become a more integral part of the Divinity School community. Some activities are planned annually to include husbands and families. Faculty wives are also invited to attend Dames meetings.

The Duke Student Field Work Association. The Duke Student Field Work Association is the organization of students who participate in the Field Education Program.

At least six meetings per year are held for the purpose of fellowship and preparation for the field education responsibilities.

The Duke Divinity School Review

Three times each year (autumn, winter, and spring) the Divinity School publishes a magazine designed to acquaint its readers with current theological thinking through the inclusion of public addresses given at the school, articles by faculty members and others, and book reviews. The *Review* is circulated free of charge to a mailing list of some 2,600, including alumni of the School, interested friends, campus ministers, teachers, administrators, and librarians. It is also available to students upon request.



4

Financial Information

Fees and Expenses

Estimated Living Expenses. The total cost for a student to attend the Duke Divinity School varies according to individual tastes and requirements; however, experience indicates that a single student may expect to spend from \$2,600 up, with the average approximately \$2,900, and a married couple may expect to spend from \$4,900 up.

Master of Divinity and Master of Religious Education Candidates. The table below lists only basic minimum expenditures. In addition to the fees cited here, there is an admission fee of \$30.00 which is applied to the first term bill, and a room deposit of \$50.00. (See the relevant sections in Admissions and Housing for full details.)

	<i>Per Semester</i>	<i>Per Year</i>
Tuition—M.Div. and M.R.E.	\$625.00	\$1,250.00
Approximate Cost of Meals	300.00	600.00
Room (double) Graduate Center	175.00	350.00

Tuition will be charged at the rate of \$50.00 per semester hour. The figures shown are for a program carrying 25 semester hours per annum. Students will be charged for additional hours of course enrollment, but in no case will the total tuition charge for the six semesters (four semesters or two academic years in the case of the M.R.E. degree program) cumulatively exceed the total of three academic years of study at the current tuition rate. Tuition accumulated in the course of studies attaining the same will entitle students to enroll for courses thereafter free of charge.

Master of Theology Candidates. A student who is a candidate for the Th.M. degree will be liable for tuition on the basis of 24 semester hours at the rate of \$50.00 per semester hour. All other costs and regulations for the Th.M. degree are the same as those for the M.Div. and M.R.E. degrees.

Special Student. A special student is one who is enrolled for academic credit, but who is not a candidate for a degree at that time. The tuition will be charged on an hourly basis. Other costs and regulations are the same as those for the M.Div. and M.R.E. candidates. No financial aid is available.

Audit Fee. Anyone seeking to audit a course in the Divinity School must, with the consent of the instructor concerned, secure permission from the Dean's office. In accordance with the general University practice, a fee of \$40.00 per course will be required of all auditors who are not enrolled students.

Athletic Fee. Divinity School students may secure admission to all regularly scheduled University athletic contests held on the University grounds during the entire academic year by payment of the athletic fee of \$25.00 per year, plus any federal tax that may be imposed. This fee is payable in the fall semester.

Payment and Penalty. The tuition is due and payable not later than the day of registration for that semester. In unusual circumstances, a student may secure permission of the Dean to delay registration, provided it is not beyond the first week of classes and the student pays the \$10.00 late registration fee. No student is admitted to classes until arrangements are made with the Bursar of the University for the settlement of fees. After the day of registration no refund of tuition will be made except if the student involuntarily withdraws to enter the armed services or dies during the course of the semester.

A student who is reported by the Bursar's Office as delinquent in his account will be debarred from credit in courses, nor will he be approved for graduation until all indebtedness has been settled.

Housing. The charge for each person in a double room for the academic year is \$340.00 in the Graduate Center. The limited number of single rooms are reserved for returning students.

The fee for Town House Apartments is \$626 each for the academic year on the basis of three students to an apartment. Utility charges are included in these fees.

Housing fees are subject to change prior to the 1973-74 academic year. A \$50.00 deposit is required on all reservations.

No refund on housing fees is made to students who withdraw after the date of registration, except for those who involuntarily withdraw to enter the armed services. Such refunds will be made in accordance with the University's established schedules.

For further information on housing facilities, see Living Accommodations in the chapter on Community Life.

Food. Food service, on East and West Campuses, is described under Living Accommodations. The cost of meals approximates \$2.50 to \$3.25 per day, depending upon the needs and tastes of the individual.

Student Health

The payment of tuition entitles the student who is taking a minimum of 7 hours to full medical and surgical care, with the exceptions noted below. This service is under the direction of the University physician with the cooperation of the staff of Duke Hospital. It includes hospitalization, medical and surgical care, drugs, dressings, X-ray studies, and ward nursing. A charge for board is made at the same

rate as in the University dining halls. Refraction of eyes, treatment of teeth, and of all chronic conditions, such as the removal of diseased tonsils, are not included in this service. The cost of any necessary braces and orthopaedic appliances, as well as of special nursing, must be borne by the student.

Since the Student Health Program *does not cover students while away from the Duke Campus*, it is imperative that student pastors and assistant pastors (winter and/or summer) who are subjected to the hazards of highway travel with great frequency, secure complementary health and accident insurance for the full twelve month period. Students whose course load entitles them to full coverage under the Student Health Program are eligible to secure a complementary insurance policy, providing protection for the entire calendar year, through the University. Costs and details of the complementary policy are available from the Assistant Dean. Students in internship programs carrying less than seven semester hours in any given semester are strongly encouraged to apply for this insurance. *Foreign students are required to hold this or another acceptable policy.*

Married students are required to carry insurance coverage for their dependents, providing for hospital, medical, and surgical care.

Motor Vehicles

Each student possessing or maintaining a motor vehicle at Duke University shall register it annually at the beginning of the fall semester. If a student acquires a motor vehicle and maintains it at Duke University after academic registration, he must register it within five (5) calendar days after operation of the vehicle on campus begins. Resident students are required to pay an annual parking fee of \$30.00 for each automobile and \$10.00 for each two-wheeled motor vehicle. The proper registration emblem must be displayed at all times.

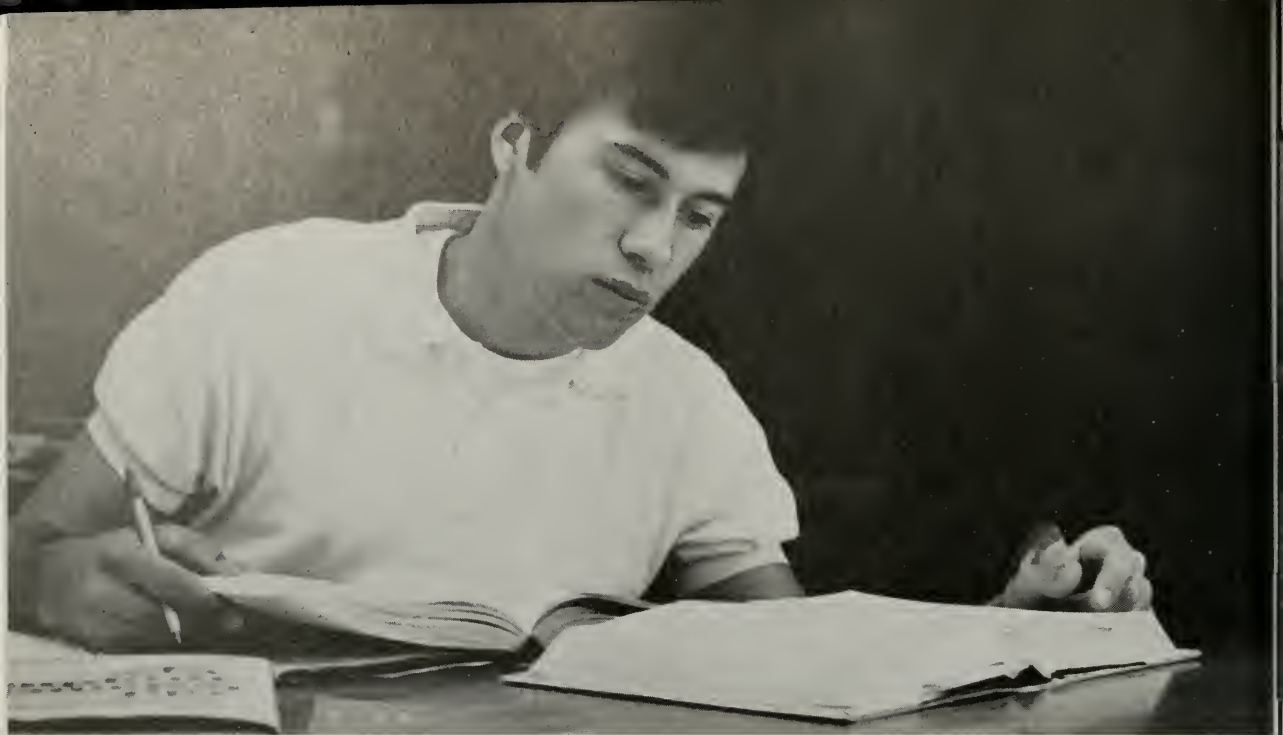
At the time of registration of a motor vehicle, the following documents must be presented: (a) state vehicle registration certificate; (b) valid driver's license; (c) satisfactory evidence of automobile liability insurance coverage within limits of at least \$10,000.00 per person and \$20,000.00 per accident for personal injuries, and \$5,000.00 for property damage, as required by North Carolina Motor Vehicle Law.

Students will receive a copy of the Parking, Traffic, and Safety Regulations when they register.

Student Financial Aid

A student should select his school on the basis of educational opportunity. At the same time, financial consideration will be a legitimate and often pressing concern. Each student should formulate at least a tentative plan for financing his seminary education. While the exact method of financing the full theological degree cannot be assured at the beginning, he should have a clear understanding of his expenses and the sources of income for his first year and the assurance that there exist ways of financing the subsequent years.

The Committee on Scholarships and Financial Aid will counsel the student concerning financial needs and possible resources. A first principle of our financial aid program is that basic financial responsibility belongs to the student, who is expected to rely upon his personal and family resources and his earning and borrowing power. Financial aid is provided to supplement student resources to the extent of demonstrated need.



In estimating student budgets, the Financial Aid Office adds to the fixed cost of educational expenses (tuition, fees, etc.) the average cost per student, providing for variations occasioned by the student's status (single, married, dependents, student pastor, indebtedness, etc.) at the time of admission. Students are allowed to exercise freedom and express their legitimate individuality in the use of their funds, but financial aid support is necessarily determined by what is considered average for students within the same category. To maintain a creative and at the same time a realistic program of financial aid, it is essential both to understand and to follow basic principles undergirding the program.

Duke Divinity School is aware of certain factors which may make the essential financial needs of minority students different from others. Minority students seeking to enter a seminary are invited to inquire about the financial arrangements available at Duke Divinity School.

Resources are not sufficient to guarantee the complete underwriting of every student's seminary education. However, it is the goal of the Financial Aid Office to assist each student in planning his financial program so that he will incur as little indebtedness as possible.

The Financial Aid Office constantly reviews available resources in order to assist the greatest number of students. It recommends assistance on the basis of demonstrated need and then within the limits of the conditions set forth governing each resource.

Financial assistance may consist of scholarships, loans, tuition grants, grants-in-aid, field education grants, and employment, which may be worked out in various combinations on a year-to-year basis with reapplication and review each year.

Financial Resources

Personal. These may be savings and earnings, gifts from family and friends, and, if married, earnings of spouse and gifts from parents of spouse. In calculating anticipated income, the student first considers his own resources.

Church. Many local churches and conferences or other governing bodies provide gifts and grants for theological education, such as Ministerial Education Funds which provide grants and/or service loans to theological students. The student makes application to his own church, Annual Conference, Presbytery, or other governing body. The Financial Aid Office cooperates with these church agencies in making recommendations and in handling the funds. *Both United Methodist students and others must be under the care of the appropriate church body to be eligible for church support.* The school cannot compensate for a student's indisposition to receive church funds when such are available on application through the Annual Conference Ministerial Education Fund.

The Divinity School, as a member school of the Association of United Methodist Theological Schools, takes cognizance of and subscribes to recommended policy and practice regarding the administration of United Methodist Church funds for student financial aid as adopted by the Association, June 15, 1970, and as bearing upon tuition grants, as follows:

"Resources for tuition grants, scholarships or the like are primarily available to students with declared vocational aims leading to ordination or recognized lay ministries and supported by commendation or endorsement of appropriate church representatives. At the same time, we believe that consideration for a tuition grant may be accorded to students who adequately indicate conscientious concern to explore, through seminary studies, a recognized church-related vocation. Finally, it is our judgment that, where the above mentioned conditions are deemed to be absent respecting a candidate for admission, the decision to admit such a candidate should be without the assurance of any tuition subsidy deriving from church funds." (AUMTS Minutes, June 15, 1970.)

Divinity School Scholarships. A limited number of scholarships are available to encourage qualified students to pursue their preparation for the Christian ministry. Such students ordinarily will not be eligible for remunerative employment during the academic year. When a student holding a scholarship is permitted to engage in remunerative employment, it is understood that adjustments may be made in the total Scholarship and Financial Aid Program for that student.

Junior Scholarships. Junior scholarships are available to a limited number of entering students of the junior year who are candidates for the Master of Divinity degree and are awarded on basis of academic record and promise of usefulness in Christian ministry. These scholarships are for the amount of up to \$750 depending upon demonstrated need. Likewise, tuition grants in varying amounts are available up to full tuition if demonstrated need warrants. Further, if the student applies, he may anticipate placement for the Summer Endowment and Field Education Program. Junior Scholarships are not renewable.

National United Methodist Scholarships. The General Board of Education of The United Methodist Church makes available two \$500 scholarships to rising middlers who have made outstanding records in the first-year class. The Department of the Ministry offers these scholarships to students preparing for the parish ministry.

Middler Scholarships. Ordinarily five Middler Scholarships of up to \$750 are made available to rising middlers on the basis of academic attainment, character, and promise for the Christian ministry. The exact amount of the scholarship is dependent upon demonstrated need of the student.

Senior Scholarships. Two Rowe Scholarships for Seniors and five additional

Senior Scholarships in amount of up to \$750, depending on demonstrated need, are awarded to rising seniors who have achieved academic excellence and who give unusual promise of service in the Christian ministry.

Foreign Student Scholarships. In cooperation with the Crusade Scholarship Committee of The United Methodist Church and other authorized church agencies, students are selected and are admitted to courses of study. Scholarships for such students are provided from the Lewis Clarence Kerner Scholarship Fund and from individual churches and private philanthropy.

Th.M. Scholarships. A limited number of scholarships, based on academic achievement and financial need, are awarded each year.

M.R.E. Scholarships. A limited number of scholarships, based on need and academic achievement in undergraduate school, are available.

Tuition Grants. These are available in amounts commensurate with demonstrated need as adjudged by the Committee on Scholarships and Financial Aid. Entering students may apply, on notice of admission, by submitting the Financial Aid Inventory to the Office of Financial Aid. Enrolled students may apply by annual renewal of their Financial Aid Inventory, subject to review with each semester registration. Because of the purpose and attendant educational objectives of the school, resources for tuition grants are primarily available to students with declared ministerial aims or those concerned to explore a ministerial vocation leading to ordination or recognized lay ministries.

Field Education Grants. Varying amounts are made available through the Divinity School to students who choose to participate in the Endowment and Field Education Program. This program includes the following: (1) summer assistants, (2) winter assistants, and (3) student pastors. See full description under the section on Field Education.

Loans. Loan funds held in trust by the University, as well as United Methodist Student Loans and funds supplied by the federal government, through the National Defense Education Act of 1958, are available to qualified students. Submit application by July 1.

Note: Unless otherwise indicated, all correspondence concerning financial aid should be directed to: Financial Aid Office, The Divinity School, Duke University, Durham, N. C. 27706.

Employment. Students or wives desiring employment with the University should apply to the Director of Personnel, Duke University, Durham, North Carolina. Students or wives make their own arrangements for employment either in the city of Durham or on campus.

Financial Aid Resources

Certain special funds have been established, the income from which is used to provide financial aid through scholarships and Field Education Grants for students wishing to secure training in preparation for Christian ministry. The resources listed below include endowed funds and sources of annual contributions.

R. Ernest Atkinson Legacy. This legacy was established in 1952 under the will of the Reverend R. Ernest Atkinson of Richmond, Virginia, who was a member of the Trinity College Class of 1917.

Emma McAfee Cannon Scholarship. This fund was established in 1969 by Bishop William R. Cannon in memory of his mother, Emma McAfee Cannon, and is designated to assist in tuition payment for a student from the North Carolina Annual Conference of The United Methodist Church who is studying for the pastoral ministry and planning to spend that ministry in the North Carolina Conference. If a student from that Conference is not available, the scholarship may be awarded to any other student preparing for the pastoral ministry at the discretion of the Committee on Financial Aid.

E. M. Cole Fund. This fund was established in 1920 by Mr. Eugene M. Cole, a United Methodist layman of Charlotte, North Carolina.

Dickson Foundation Awards. The Dickson Foundation, Incorporated, of Mount Holly, North Carolina, has created a scholarship program for the purpose of providing assistance to Divinity students who demonstrate financial need and superior ability. Preference is given to children of employees of American and Efrid Mills, Incorporated, and its subsidiaries, to residents of Gaston, Caldwell, and Catawba Counties, and to North Carolinians.

The Duke Endowment. Among the beneficiaries of The Duke Endowment, established in 1924, are the rural United Methodist churches of the two North Carolina Conferences. Under the Maintenance and Operation Program, Field Education Grants are available for Duke Divinity School students to participate as assistant pastors in rural United Methodist churches under the Endowment and Field Education Program.

N. Edward Edgerton Fund. This fund was established in 1939 by Mr. N. Edward Edgerton of Raleigh, North Carolina, an alumnus of Duke University of the Class of 1921.

Thomas Jefferson Finch Scholarship. In 1955 Mr. George David Finch, '24, and Mr. Brown Faucette Finch, '54, established an annual scholarship in the amount of \$750 in memory of Mr. Thomas Jefferson Finch, Trinity College Class of 1884, who was the father and grandfather of the donors.



The James A. Gray Fund. In 1947 Mr. James A. Gray of Winston-Salem North Carolina, presented the fund, which bears his name, to the Divinity School for use in expanding and maintaining its educational services in behalf of North Carolina churches and pastors.

P. Huber Hanes Scholarship. The late Mr. P. Huber Hanes, Sr. of Winston-Salem, North Carolina, an alumnus of Duke University of the Class of 1900, established for Duke University an annual scholarship fund, a portion of which is used to provide financial assistance for Divinity School students.

The Franklin Simpson Hickman Memorial Fund. In the summer of 1966 Mrs. Veva Castell Hickman established a memorial fund in memory of her husband, The Reverend Professor Franklin Simpson Hickman, who served as Professor of the Psychology of Religion, 1927-1953; was Dean of the Chapel of Duke University, 1932-48; and the first Preacher to the University, 1938-53. The income of the Fund will give support to two enterprises: (1) a regular visiting lecturer in preaching, and (2) financial aid to students in the Master of Theology program who wish to specialize in the psychology of religion, or the psychological study of religious experience.

George M. Ivey Scholarship Fund. This fund was established in 1948 by gift of George M. Ivey of Charlotte, North Carolina, an alumnus of Duke University of the Class of 1920.

Charles E. Jordan Scholarship Fund. This fund was established by the family of Dr. Charles E. Jordan in his honor.

Lewis Clarence Kerner Scholarship. This scholarship was established in 1959 by Beatrice Kerner Reavis of Henderson, North Carolina, in memory of her brother, Lewis Clarence Kerner, and designated for the assistance of native or foreign-born students preparing for service in world Christian missions.

The John Haden Lane Memorial Scholarship Fund. This fund was established in 1968 by Mr. Edward H. Lane, Jr. in memory of his brother, Dr. John Haden Lane, and is designated for the benefit of meritorious students pursuing an advanced degree such as the Master of Theology in the field of pastoral psychology whose academic training entailed clinical pastoral education.

Laurinburg Christian Education Fund. This fund was established December, 11, 1948, by gift through the Methodist College Advance Fund.

Myers Park Scholarship Fund. This fund was established in 1948 by members of the Myers Park United Methodist Church, Charlotte, North Carolina.

W. R. Odell Scholarship. This fund was established in 1946 by the Forest Hills United Methodist Church, Concord, North Carolina.

Gilbert T. Rowe Memorial Scholarship Fund. This scholarship fund was established in 1960 through the generosity of Divinity School alumni and friends of the late Gilbert T. Rowe, Professor of Systematic Theology.

Elbert Russell Scholarship. This scholarship was established in 1942 by the Alumni Association of the Divinity School in honor of Elbert Russell, who served as Dean of the Divinity School and Professor of Biblical Theology.

Hersey E. Spence Scholarship. This scholarship was established in 1947 by

the Steele Street Methodist Church of Sanford, North Carolina, in honor of Professor Hersey E. Spence, a former pastor of the congregation.

The United Methodist Church. The United Methodist Church makes a substantial contribution to the Divinity School by designating a certain percentage of its World Service offerings to the Divinity School.

The North Carolina and the Western North Carolina Conferences direct a certain percentage of their College Sustaining Funds to the Divinity School. The South Carolina Conference is a contributor to the Divinity School operational income.

The General Board of Education make available annually two National United Methodist Scholarships having a cash value of \$500 each.

Local United Methodist churches and individuals make contributions to the financial aid program of the Divinity School, thus making it possible to assign students under the Endowment and Field Education Program to urban and out of state churches.

Dempster Graduate Fellowships. The United Methodist Board of Education offers each year the Dempster Graduate Fellowships for graduates of United Methodist Theological Schools, who are engaged in programs of study leading to the degree of Doctor of Philosophy in religion with a view to teaching in United Methodist colleges and seminaries. Several Divinity School graduates have held these fellowships.



Admission

Requirements and Procedures for Admission

The Divinity School is a fully accredited member of the American Association of Theological Schools, and is one of fourteen accredited seminaries of The United Methodist Church. Candidates for admission must hold the degree of A.B., or its equivalent, based upon four years of work beyond secondary education in a college which is approved by one of the regional accrediting bodies, and their college records must be such as to indicate their ability to carry on graduate professional studies. They will be considered for admission without examination on presentation of an official, satisfactory transcript of college and all other academic credits which they have secured. Statements of reference are required.

Applications are evaluated with a view both to the academic achievement of the candidate and with reference to his personal and professional qualifications for the Christian ministry. While an overall academic average of less than *B—* (or 2.70 on a 4.0 scale) is ordinarily regarded as a disqualification for admission, nevertheless, the Committee on Admissions is impressed with a rising curve of achievement in the undergraduate program and makes its decision on the basis of the whole body of credentials of an applicant, including supporting letters of reference and a personal statement of purpose.

The applications of students from foreign countries will be considered, each on its own merits, the general principle being that training equivalent to that of a baccalaureate degree from an accredited American college must have been secured.

In addition to an adequate academic preparation, applicants must satisfy the Admissions Committee as to their Christian character and purpose.

An application blank may be secured from the Admissions Office of the Divinity School. Applications received after May 1 cannot be assured of dormitory rooms for the ensuing academic year. A minimum of thirty days is required to process any application, in many cases longer. There is no charge for processing an application.

No admission is final until approved by the Student Health Service, which requires a certificate of immunization and general health to be submitted not earlier than July 1 and not later than September 1.

Entering students are also required to take tests administered by the University Counseling Center and the Divinity School.

Persons who do not matriculate at the time for which they were originally admitted forfeit admission unless postponement has been made for later entrance. A student who withdraws and desires to return at a later date must file with the Dean a written request for a leave of absence.

Applicants are expected on notification of admission to signify their acceptance within three weeks, and to pay an admission fee of \$30.00. (Make check payable to Duke University and send to the Admissions Office of the Divinity School.) This fee is applied to the regular first-term bill when the student matriculates.

Under the terms of the Selective Service Act, pre-enrollment for later admission may be granted to persons who meet the Divinity School standards for admission. Applications for pre-enrollment may be addressed to the Admissions Office. Pre-enrolled students send transcripts of each year's college work by June 15 of each year in which they are pre-enrolled. Pre-enrollment does not guarantee final admission.

Students should consult this *Bulletin* on Financial Aid and Resources.

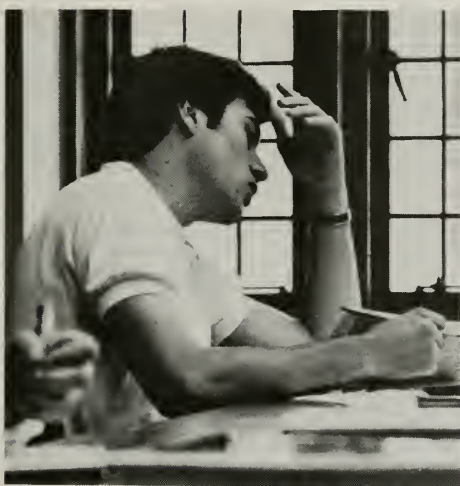
Schedule of Admissions and Notification of Applicants. Applicants may expect to receive notice of action taken with respect to applications for the succeeding academic year as follows: Applications for admission received June 15 to September 15 will be acted upon and notice mailed on or about November 15. The second notification will be mailed on or about January 15 for applications received between September 15 and November 15. March 15 will carry the third notification for applications received between November 15 and January 15. The fourth notification will be on or about April 25 for applications received between January 15 and March 15. After March 15 and until June 15, applications will be acted upon and notification rendered on the basis of remaining vacancies. Admissions may be closed at any time after May 1, and will ordinarily be closed after June 15 for matriculation in the succeeding September.

Pre-Seminary Curriculum. The Divinity School of Duke University publishes as its own the policy statement of the American Association of Theological Schools respecting undergraduate preparation for graduate-professional theological studies.

The student contemplating theological study should correspond at the very earliest opportunity with the school or schools to which he intends to apply and with the authorities of his church in order to learn what will best prepare him for the specific program he expects to enter. He will be likely to find under the guidance of the seminary that he should consider the following subjects:

English language and literature; history, including non-Western cultures as well as European and American; philosophy, particularly its history and its methods; natural sciences, both the physical and the life sciences; social sciences, where psychology, sociology, and anthropology are particularly appropriate; the fine arts and music, especially for their creative and symbolic values; Biblical and modern languages; religion, both in the Judeo-Christian and in the Near and Far Eastern traditions.

Some seminaries require Greek or Hebrew for admission, and many ad-



vanced biblical courses are offered in the original tongues; modern languages have a less direct but immensely educative role and are required at the graduate studies level.

It is the understanding gained in these fields rather than the total of credits or semester-hours which is significant.

In many seminaries students who have been well prepared in religion and equipped with the tools of theological study will be set free, not to complete their theological course more quickly, but rather to pursue more advanced studies. The principle constantly to be kept in mind is not that of satisfying paper regulations and minimum requirements, but of making the most of opportunities for education.

Transfer of Credit. Under certain conditions transfer of credit from theological schools accredited by the American Association of Theological Schools is provided for by the Divinity School. Applications for transfer of credit will be ruled upon by the Committee on Admissions, and will be subject to evaluation in terms of the prevailing requirements of the Divinity School for graduation. Ordinarily, credit from another institution will not be granted in amount exceeding one-half of

the total credits required by the Divinity School for graduation. A student applying for transfer of credit in excess of this amount may be required to pass such examinations as the Committee on Admissions may prescribe. In each case a letter of honorable dismissal from the school from which transfer is made is required along with transcript of academic credits.

Advanced Standing. Advanced standing allows entering students to begin work in any given field at a level higher than that of the required curriculum, or to substitute a specialized or cognate course for a required one.

Entering students with substantial undergraduate preparation in areas closely related to required courses of the Divinity School may be eligible for advanced standing. While a student may be eligible for advanced standing in any subject, it is especially pertinent where students offer undergraduate majors of superior quality in Bible, religion, or philosophy. Students entering with 6 or more semester hours in the Greek language should consult the *Bulletin* under Language Study for a description of special privileges pertaining to their case. The fields in which entering students, by virtue of previous undergraduate study, are most likely to qualify for advanced standing are: Old Testament, New Testament, and Church History.

An entering student who offers not less than 6 semester hours of college credit, with a grade of *B* or better in one or more of these areas, may ordinarily anticipate advanced standing in correspondingly required courses. All final transcripts will be studied, and advanced standing will be accorded to those who qualify under this provision.

A student who offers not less than three semester hours of college credit with a grade of *B* or better in one or more of these areas may, for satisfactory performance in a qualifying examination in the discipline, be granted advanced standing. Entering students who qualify under this provision must, on notice of admission, make request for the privilege of sitting for such an examination.

Admission on Probation. Applicants for admission who are graduates of non-accredited colleges will be considered on their merits. Ordinarily, such applicants must show that they have attained a superior average for a four-year college course. Admission of such persons will, in every case, be on probation.

Applicants for admission who are graduates of accredited colleges but whose college transcripts do not fully meet Divinity School standards may be admitted on probation if their recommendations otherwise justify admission.

Probation means:

1. Students who during the first year of Divinity School work maintain less than a *C* average, including one or more failures, ordinarily will be required to withdraw from the School.
2. Students admitted on probation may carry only limited schedules of work, the amount to be determined by the Assistant Dean.
3. A student admitted on probation ordinarily shall not be admitted for advanced standing.

Students whose work after admission is not satisfactory may be placed on probation.

Ministerial and Professional Qualifications. All students who are admitted to academic study in the Divinity School are subject to the established order of administrative regulations of the University and the accepted standards of personal conduct it enjoins; continuance in the School is conditioned upon acknowledgment of and compliance with such regulations and standards.

In particular, the University and the Divinity School expect and require students in candidacy for degrees, leading to a ministerial vocation, not only to exemplify the dignity of their calling, but to exhibit attitude and conduct conformable with the recognized standards of their Christian profession. While no honor system relating to academic integrity is formalized within the Divinity School, application for and admission to the courses of study assume the student's assent to full compliance with recognized standards of integrity in the fulfillment of academic tasks.

On this prior understanding, therefore, the University reserves the right, and matriculation by the student is a concession to this right, to compel the withdrawal of any student whose conduct at any time is not satisfactory to the University, even though no specific charge is made against the student.

As a graduate-professional school of theology, the Divinity School expects, on the part of the student, an increasing manifestation of maturity and professional purposiveness in discharge of personal and academic responsibilities appropriate to the level of advanced academic work leading to the high and exacting demands of the Christian ministry. Since personal and professional qualifications for the ministry will be considered in evaluating the candidacy of all students for degrees, students whose progress or development indicate that they are not suited to the work of the ministry will not be allowed to continue in the School.

English Deficiency. Students whose English testing scores show marked deficiency or who are reported by their instructors as deficient in English usage may be required to take Remedial English in addition to meeting other requirements for the Master of Divinity degree.

Faculty Advisers. Each entering student is assigned to a faculty adviser with whom he will consult concerning his course of study. The student will continue to consult with his adviser throughout the period of his academic work.



6

Field Education

Nature and Purpose

Field Education has a two-fold nature: (1) As a clinical dimension of theological education, it provides a context for growth in professional competence and self-understanding, testing of theory in observation and practice, and application of theological, psychological, and sociological insights to experiences in the field; and (2) It is, moreover, a symbol of the relationship between the critical, intellectual life of the church that occurs in the seminary and the ministry and mission of the church that is practiced in the world.

The Field Education Program conceives of ministry as a function of the church. It embraces manifold expressions within singleness of motivation by the Holy Spirit and its relationship to the church. We recognize both the validity of specializations and the need to introduce students to a broad spectrum of parish-related and non-parish ministries. Field education experience in the student's intended ministerial function will be arranged when possible, usually in the senior year.

Types of Field Education

1. Approved Assignments. The Master of Divinity curriculum requires that each student "... complete one approved assignment in field education (with or without remuneration) under supervision. . . . Such assignments might include an internship, a summer of full-time work, or two semesters of part-time work, or involvement in church or community service. The essential criteria for purposes of meeting the requirement would be that the amount and quality of supervision be approved by the Field Education Office and that the student be required to evaluate and correlate the experience directly or through his Ministry-in-Context."

With the exception of internships which are subject to special educational criteria, the approved assignments are characterized by the quality of supervision employed in placement and in the meeting of students in concomitant peer groups

under the leadership of trained supervisors. One such approved assignment will be arranged for each student during his Master of Divinity course of study.

A student may satisfy the requirement of an approved assignment in field education by (1) participation in a peer group concomitant with a summer of full-time work, two semesters of part-time work (or non-remunerative service) or a year of service as a student pastor, (2) successful completion of an internship, a quarter of Clinical Pastoral Education or a Ministering-in-Context Project, or (3) participation in field work under the supervision of a qualified professional when the experience involves action/reflection sessions under the direction of a leader certified by the Office of Field Education.

2. Field Work for Educational Purposes. Under the provisions listed below, students may employ their field work (See the section on Types of Field Work in this *Bulletin*, p. 42) for educational purposes. Most assignments currently made by the Office of Field Work Placement will not be made for explicitly educational purposes. Churches generally seek the services of students to do particular jobs, and students are assigned to these positions with their consent and at their request. The Field Education Office is not necessarily involved with such field work.

Some students may nevertheless discover educational potential in these positions and apply therefore to the Field Education Office for recognition of their work as field education. A one-page prospectus indicating the way in which one expects to use field experiences as learning opportunities should then be submitted to the Field Education Office for approval. Upon approval of a prospectus, an adviser will be assigned to oversee the students' field-learning experience. When a field work assignment is modified in this way, the student is expected to take initiative in making his work educational, and the responsibility is his to demonstrate to the satisfaction of the Field Education Office and his supervisor that his work is educational. Such field education experiences meet the requirement of an approved assignment *when* the criteria listed in the third paragraph under 1 above have been met.

The Divinity School does not assume responsibility for making all field work educational; it does, however, recognize that a job which is taken initially for remuneration or service may be found by the student to be educationally significant or promising.

3. Internships. An expanding program of nine to twelve month internships is currently available. Periodic reports to the assigned faculty adviser are required and academic credit is given upon the satisfactory completion of a relevant academic study program. Students who have completed at least two full years of their seminary curriculum are eligible to apply. See section on Internships in the chapter entitled Courses of Instruction.

Field Work Placement

The purpose of the Office of Field Work Placement is (1) to provide opportunities for students to serve in churches and other contexts for ministry, (2) to assist students financially, and (3) to help churches and other agencies to find the workers they need.

Work assignments may be used for educational purposes subject to provisions outlined under the section Types of Field Education in this *Bulletin*.

Types of Field Work. The following are types of field work:

1. Summer Assistant Pastors. Upon request of a church, a student is assigned

by the Committee on Field Work Placement to serve ten weeks as an assistant. The student is provided board, room, laundry, necessary travel, and a Field Work Grant of \$1,200.00. To participate, the student must complete the preparatory training. A majority of the students are assigned to United Methodist rural charges in the State of North Carolina. Although prior consideration is given to rising mid-dler and senior students, a limited number of entering students can be assigned. Students transferring to another seminary are not eligible for assignment the summer prior to transfer.

2. Winter Assistant Pastor. Students are assigned to consultation with pastors, church leaders, district superintendents, and/or other responsible leaders, and serve as assistants to ministers during the academic year. Work time will vary from six to sixteen hours per week, and the Field Work Grants will vary accordingly, up to a maximum of \$1,200.00.

3. Student Pastors. A student may be appointed by an annual conference or other official agency of a recognized denomination to serve as a student pastor. The student must have the approval of the Director of Field Work, as agent to the Dean, before accepting an appointment as a student pastor. All *new* student pastors must participate in an orientation and training program. Student pastors ordinarily enroll for not less than seven nor more than ten hours per semester, thus requiring, in most cases, four academic years to complete the Master of Divinity degree. If the charge being served is located beyond 50 to 55 miles from the campus, the student is required to live in Durham or vicinity during the academic week, Monday 12:00 noon through Friday 4:00 p.m. Salaries and other forms of support are arranged by church officials in keeping with denominational policies and are reported to the Divinity School if this type of financial aid is wanted. (A student pastorate may become a field education assignment when the conditions set forth in paragraph 1 or 2 under the section on Field Education have been met.)

4. Other Church-Related Positions. These consist of teaching church school classes and counseling youth groups and are expected to require no more than three to six hours per week. These positions may not involve remuneration or grants, but sometimes do.

The Director of Field Work Placement will arrange for suitable supervision as circumstances and resources demand and will allow.



7

Programs of Continuing Education

Divinity School Seminars

Each year the Divinity School, with the support of the James A. Gray Fund, and in cooperation with United Methodist Conference Boards of Ministry, conducts a series of extension or regional seminars. To these seminars are invited Duke alumni and other ministers, both professional and lay. These annual events operate as workshops for pastors and other church leaders. Leadership for the seminars include faculty representatives from Duke and other institutions as well as prominent churchmen from the region.

During the fall semester of the academic year, 1971-72, the regional seminars were held in Columbia, South Carolina, and Richmond, Virginia, under the direction of Dr. William Arthur Kale, Professor of Christian Education.

The Columbia seminar, jointly sponsored by the Divinity School, the Commission on Continuing Education and the Program Council of the South Carolina Methodist Conference, and the Lutheran Theological Southern Seminary, was held on the campus of the Lutheran Seminary in Columbia, November 8 and 9, 1971. The theme was: "Stewardship as a Style of Life." The leaders were: Dr. Oswald Perry Bronson, President of Interdenominational Theological Center, Atlanta, Georgia, and Dr. Kenneth Willis Clark, Professor Emeritus of New Testament at Duke and Co-Director of the International Greek New Testament Project.

The Richmond seminar was planned in collaboration with the Board of Ministry of the Virginia Methodist Conference and was held in Reville United Methodist Church, November 11 and 12, 1971. The theme was: "The Church and Extremism." The leaders were: Dr. Ezra Earl Jones, of the Department of Research and Survey, the National Division of the Methodist Board of Missions, New York City, and Dr. Robert L. Wilson, Research Professor of Church and Society, at Duke.

The Henry Harrison Jordan Loan Library

Henry Harrison Jordan, distinguished member of the Western North Carolina Conference (1862-1931) was memorialized by his children in the establishment of an endowment in 1947. The Divinity School librarian is the custodian of books purchased under this fund for loan, through postal services, to qualified ministers

of all denominations or localities. The Jordan Loan Library undertakes to maintain a catalogue of up-to-date publications representative of the several theological disciplines and areas of the minister's professional interest. Books are loaned on application to the librarian of the Divinity School.

Divinity School Summer Clinics

Four clinics, running concurrently, for ministers, wives, and church leaders of all denominations, will be conducted at the Duke Divinity School, July 24-August 3. These are designed to supplement seminary education through two weeks of intensive training in one selected subject. No academic credit is given. Participants are expected to attend the full two weeks from the opening dinner to the closing luncheon.

Clinics for the summer of 1972 are: Communication and Preaching; The Minister's Marriage and His Family; Christian Faith and Cultural Revolution; and Church Dynamics in the Racially Changing Community.

The cost is as follows: registration fee—\$10.00; tuition—\$60.00; air conditioned dormitory room, single, two weeks—\$39.00; air conditioned dormitory room, double, two weeks—\$29.00.

Sponsoring institutions make available funds for tuition. Other scholarships are available upon request. For full information: Write to the Director, Summer Clinics, Duke Divinity School, Durham, North Carolina 27706.

The Course of Study School

In cooperation with the Department of Ministry of the Board of Education and the Southeastern Jurisdictional Conference of the United Methodist Church, Professor Paul A. Mickey directs The Course of Study School for pastors of The United Methodist Church. This school is in session for approximately four weeks each summer, and the required studies for one full year can be completed in this period. This is not a part of the regular work of the Divinity School degree program and no credit toward a seminary degree can be earned. The faculty includes representatives from the Divinity School and other church-related institutions. The twenty-fourth session of the Course of Study School is from July 5-28, 1972.

The J. M. Ormond Center for Research, Planning, and Development

In memory of the late Dr. J. M. Ormond, Professor of Practical Theology of the Duke Divinity School and Director of the Rural Church Program under The Duke Endowment 1923-1948, the North Carolina Annual Conference established the J. M. Ormond Fund in 1951. This fund was a part of the special effort by the North Carolina and the Western North Carolina Conferences of The United Methodist Church to raise extra funds for The Divinity School. The Center is under the Director of Research, Professor Robert L. Wilson, and is jointly supported by the Ormond Fund and the program of the rural church under The Duke Endowment. This Center, structured in cooperation with the two Annual Conferences, has as its purpose assisting the church to perform its ministries. The Center utilizes the methodologies of the social sciences to provide research and planning services for congregations and denominational organizations.

Other Programs

Facilities for Advanced Study through the American Schools of Oriental Research. Duke University is one of the supporting members of the American Schools of Oriental Research. Accordingly, students in the Divinity School have the privilege of attending the Albright Institute of Archaeological Research in Jerusalem, the American Center of Oriental Research in Amman, and other similar institutions without charge for tuition. They may also compete for the four fellowships offered annually by the Schools, the stipends depending upon available funds.

Programs in Pastoral Psychology. Programs in pastoral psychology beyond the studies incorporated in the M.Div. curriculum are provided in cooperation with the Duke University Medical Center. Four such special programs are available.

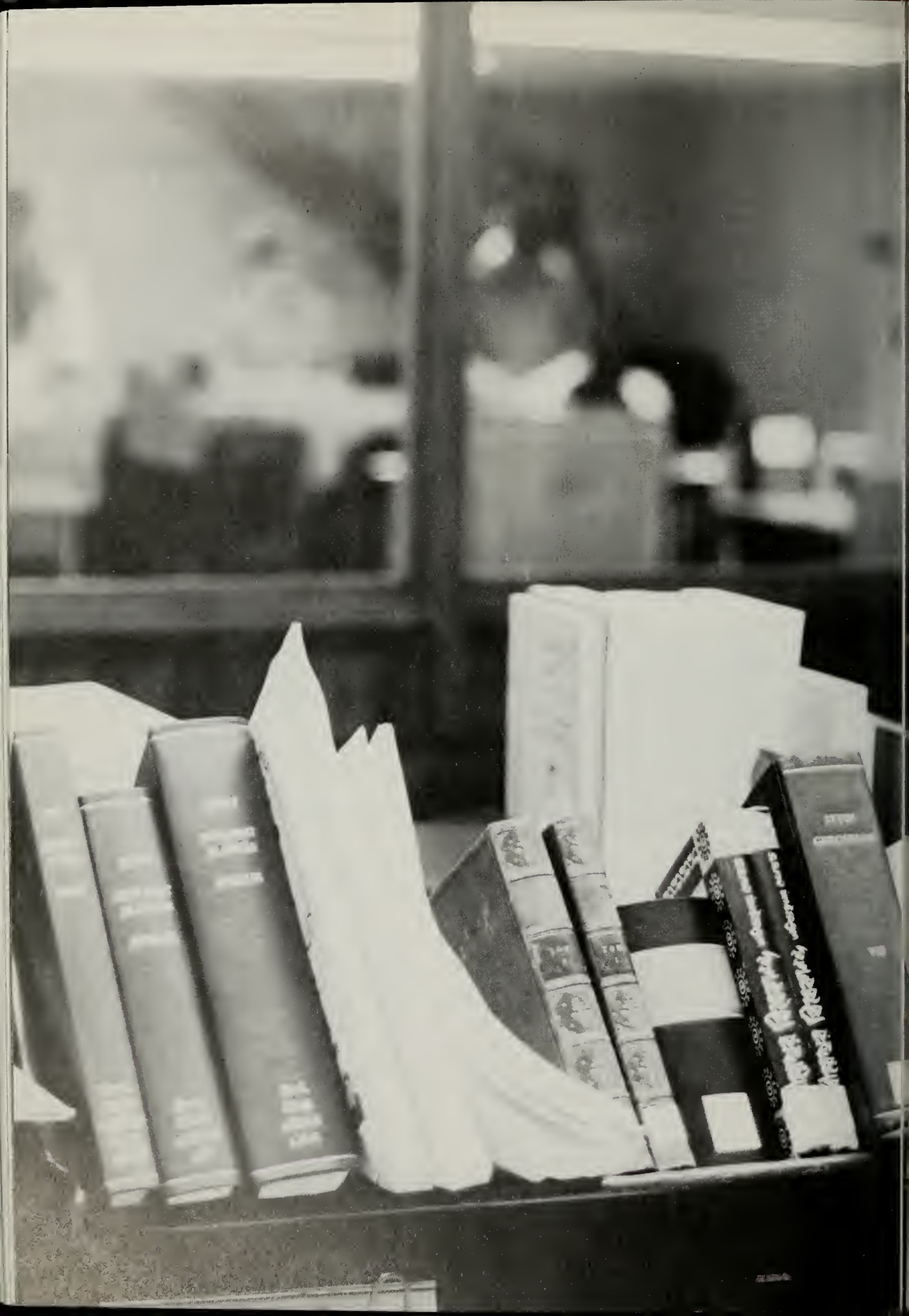
1. The Master of Theology degree with a major in pastoral psychology is ordinarily a calendar year program beginning the first full week in June. However, upon the recommendation of the staff, candidates with a quarter or more of clinical pastoral education may begin their program in September. The candidate may plan one of three programs or concentrations: a concentration in pastoral theology relating psychology and theological understanding to professional ministry, especially the parish, through coursework and supervised field or clinical experience; a concentration in pastoral care through coursework and an intern year in Basic Clinical Pastoral Education; a concentration in pastoral counseling through coursework and a year of Advanced Clinical Pastoral Education. In the context of clinical pastoral education various professional goals may be sought including general understanding and skills in pastoral care and specialization in pastoral counseling and clinical supervision. The CPE is certified by the Association for Clinical Pastoral Education. Persons specializing in pastoral counseling will be moved toward certification with the American Association of Pastoral Counselors. A quarter of clinical pastoral education (PP 277A or its equivalent) is considered a prerequisite for all programs. Candidates who extend their program over the calendar year receive four certified units of clinical pastoral education.

2. Single quarters of basic clinical pastoral education are offered to qualified candidates beginning the first of February, running concurrently with the second semester in the Divinity School, and also beginning the first Monday in June, running eleven weeks.

3. A one year certificate or non-degree internship program in CPE is available through the Duke Medical Center for persons who hold the Master of Divinity degree or its equivalent. Also, students who wish to pursue a pregraduation intern year are invited to apply, provided they have completed at least one year of theological education. The certificate, non-degree intern year can be done at any level of CPE (basic, advanced, supervisory) for which the candidate and the supervisory staff judge him to be ready. These persons may enroll in Divinity School as special students for a course or two each semester. Such training normally provides four quarters of certified CPE credit.

4. A two-week clinic in pastoral care is provided each summer as part of the Divinity School's continuing education program for persons with the M.Div. or equivalent degree.

For further information concerning any of these programs, write to Dr. Richard A. Goodling, Director, Programs in Pastoral Psychology, Duke Divinity School. See Master of Theology degree program.



8

Resources for Study

Library Resources

Divinity School Library. The Divinity School Library, containing a collection of more than 150,000 volumes in the field of religion and closely related disciplines, affords an unusual wealth of material for the seminary student. Although it is an integral part of the University's nine-unit library system, which possesses more than 2,300,000 volumes, the Divinity School Library has its own separate facilities in the Divinity School building. Its book collection is operated on the open stack system, and its reading rooms provide study facilities for students, housing space for the special reference collection in religion and for the current numbers of the more than 550 religious periodicals to which the library subscribes.

Staffed by a librarian and a reference librarian who are trained in theology as well as in library administration, and by a circulation staff of two persons aided by a number of student assistants, the Divinity School Library offers a variety of reference services to assist the student in selecting and locating materials. The staff, in cooperation with the faculty, maintains a book and periodical collection to support both basic courses and advanced research in all major fields of religious studies.

The Divinity School Library is adjacent to the Perkins Library, thus affording easy access to its many departments. The seminary student is permitted to withdraw books from the collection of more than 1,400,000 volumes in the Perkins Library, and to make use of its other resources and facilities which include manuscripts, archives, public documents, newspapers, periodicals, microfilms, maps, rare materials (among which are fifty-three prized ancient Greek manuscripts), reference assistance, and provision for the borrowing of books not in the Duke libraries from the Library of the University of North Carolina and other institutions.

Ormond Memorial Fund. Established in 1924 by Dr. J. M. Ormond, '02, and Mrs. Ormond, in memory of his mother and father, Mr. and Mrs. J. J. Ormond, the income from the Ormond Memorial Fund is to be used for the purpose of a collection of books on the rural church for the Library of the Divinity School at Duke University.

Avera Bible Fund. Established in 1895 by gift of Mrs. L. B. McCullers in memory of her husband, Willis H. Avera, the fund provides for the purchase of books to be used for the Divinity School Library.

Louis W. Bailey Memorial Fund. This memorial fund was established in 1958 by the Reverend A. Purnell Bailey in memory of his father. The income is to be used for books for the Divinity School Library.

The William Arthur Kale, Jr. Memorial Fund. William Arthur Kale, Jr. was a member of the Duke University Class of 1958, a lover of sacred art and music, and a member of the University Chapel Choir. In his memory, there was established in 1964, by the provision of his parents, Professor and Mrs. William Arthur Kale, Sr., a fund for the purchase of books and other materials in the area of fine arts and religious musicology for the perpetual enrichment of the holdings of the Divinity School Library.

Corporate Worship

One of the most important aspects of a program of training for Christian service is warm and discriminating common prayer.

The center of corporate life of the Divinity School has been its own place of worship, York Chapel. Due to current construction for renovation of library facilities, Divinity School worship is conducted in the great Chapel of the University. Regular chapel services are held, at which all students are expected to be present. Services are led by members of the faculty, by visiting ministers, and by members of the student body. Each spring, the Worship Committee invites a Duke alumnus to return to the Divinity School for a week to share, through Chapel sermons and seminar discussions, his experience of the challenges and possibilities of the parish ministry.

Public Lectures

The Lecture Program Committee presented, sponsored, or co-sponsored the following lectures and special events during the 1971-72 academic year:

The New Faculty Series, with Professors Roland E. Murphy, Lloyd R. Bailey, and David C. Steinmetz; The Very Reverend Edward H. Patey, Dean of Liverpool Cathedral, England (Franklin S. Hickman Lecturer, 1971); The Reverend Principal Matthew Black, Professor of Divinity and Biblical Criticism, St. Mary's College, University of St. Andrews, Scotland (co-sponsored with the Department of Religion); The Community Reports Series, with Professors Creighton Lacy, D. Moody Smith, and Messrs. John T. Martin, Jr., and Walter R. Patten; Dr. William G. Dever, Director of the Albright Institute of Archaeological Research, Jerusalem (co-sponsored with the Department of Religion and the Division of Graduate Studies in Religion); Dr. Irving Cooper, Surgeon, St. Barnabbas Hospital, New York City (co-sponsored with the Medical School); and Dr. H. A. Ober-

man, Professor of Church History, University of Tübingen, Germany (co-sponsored with the Duke University Committee on Medieval and Renaissance Studies).

Lectures and Symposia

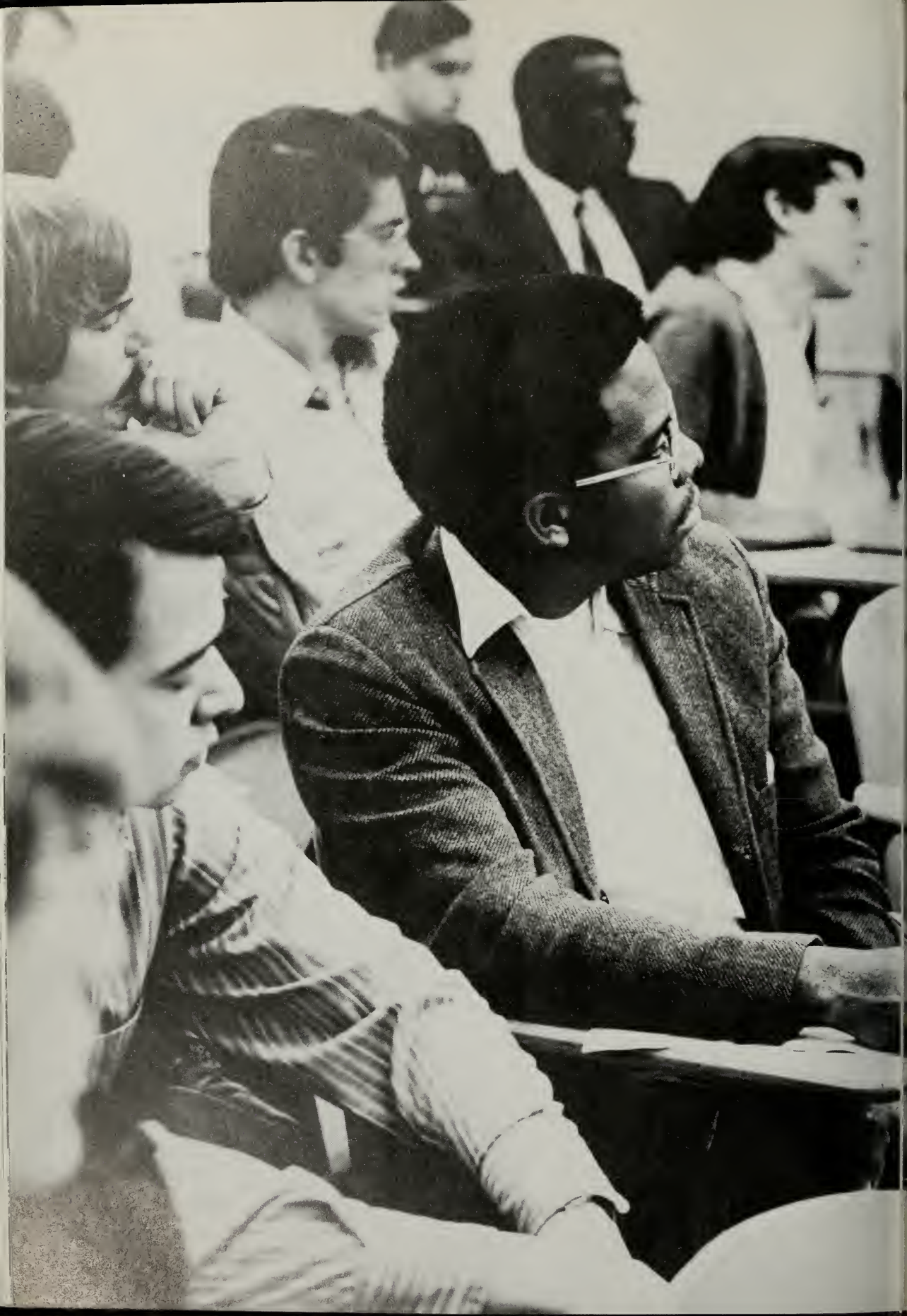
The James A. Gray Lectures. These annual lectures, established in 1950 as part of a bequest made in 1947 by Mr. James A. Gray of Winston-Salem, North Carolina, are delivered in the context of the Divinity School Convocation and the North Carolina Pastors' School, held simultaneously on the Duke University Campus. The 1971 lecturers, twenty-second in the series, was Dr. Paul L. Lehmann and Charles A. Briggs, Professor of Systematic Theology, Union Theological Seminary, New York City. His subject was "A Politics of Transfiguration for an Age of Revolution."

The 1972 lecturer will be Dr. Ray C. Petry, James B. Duke Professor of Church History, Duke Divinity School.

The Franklin S. Hickman Lectureship. This lectureship, established in 1966 as part of a bequest by Mrs. Franklin S. Hickman in memory of her late husband, Dr. Franklin Simpson Hickman. Professor of Psychology of Religion, Duke Divinity School, is an annual event designed to bring a practicing minister of extraordinary qualities to campus for the period of two weeks. It culminates in two public lectures delivered in the context of the Divinity School Convocation and North Carolina Pastor's School. The 1971 lecturer, fourth in the series, was the Very Reverend Edward H. Patey, Dean of Liverpool Cathedral (Anglican), England. His subject was "God's Word for Man's World."

The Divinity School Library Lectureship. In 1948 the Duke Divinity School Library Lectureship was established by the Reverend George B. Ehlhardt for the purpose of bringing to the Divinity School a succession of religious leaders.

Symposium of Christian Missions. Each year, the Divinity School presents a symposium on the world mission of the Church, usually including campus visits by a secretary of missionary personnel and a Duke alumnus serving overseas. The general aims are "to inform students and faculty of the philosophy and work of missions as seen through the personal experience of speakers; to educate present and future ministers so that they will have a vital concern for the promotion of missionary education in the local church; and to evaluate the missionary enterprise as a significant force in the revolutionary world."



9

Courses of Instruction

Course Enrollment

Required courses are numbered 9 to 33. Elective courses carrying credit in the Divinity School only are numbered 70 to 199. Courses approved for credit by both the Divinity School and the Graduate School are numbered 200 and above. Divinity School students seeking to enroll in such jointly approved courses must have satisfactorily passed the basic work in these fields, such as Bible, Church History, Theology and Christian Ethics. Many courses of the 200 level require permission of the instructor for enrollment by Divinity School degree candidates. All courses of the 300 level require this permission. For this prerequisite the student should consult the roster of "Courses of Instruction" in this *Bulletin* and should also refer to published Registration Advices at the time of each semester registration.

Courses jointly approved by the Divinity School and the Graduate School of Duke University are published in the *Bulletin of the Divinity School*. Those courses only which are published in this *Bulletin* are approved for fulfillment of requirements for degrees offered by the Divinity School, other than those authorized as cognate studies under the curriculum of this school.

Bible

Knowledge of the content of the English Bible is regarded as indispensable for fulfillment of conditions for the basic theological degree. Provision for review of these materials will be integral to the Old and New Testament introductory courses.

I. Biblical Studies

OLD TESTAMENT

11. Introduction to Old Testament Interpretation. An introduction to the literature, history, and religion of ancient Israel, with emphasis upon exegetical methodology. 4 s.h. *Bailey and Murphy*

101. The Prophetic Movement. A study of the prophetic movement in Israel from the earliest period to the post-exilic development of apocalyptic with special reference to the content and religious teaching of the prophetic writings. (Not offered in 1972-73.) 3 s.h. *Efrd*

106. Exegesis of the English Old Testament. Prerequisite: OT 11 or equivalent.

106A. *Genesis*. Exegesis of the book of Genesis in English. (Not offered in 1972-73.) 3 s.h. *Bailey*

106B. *Amos and Hosea*. Exegesis of Amos and Hosea in English. 3 s.h. *Bailey*

106D. *Poetry of the Old Testament*. Exegesis of selected poetical passages of the Old Testament in English. (Not offered in 1972-73.) 3 s.h. *Murphy*

109. The Religion of the Old Testament. A study of the religious ideas contained in the Old Testament with special reference to their interpretation from Robertson Smith to the present. (Not offered in 1972-73.) 3 s.h. *Efrd*

130. Seminar on Death and Dying. Critical consideration of Biblical, legal, medical, and ethical perspectives. Prerequisites: OT 11; NT 18. 2 s.h. *Bailey, H. Smith, and Others*

201. Introduction to Biblical Hebrew. Elements of phonology, morphology, and syntax. Exercises in reading and writing Hebrew. 3 s.h. *Bailey*

202. Introduction to Biblical Hebrew and Hebrew Exegesis. Study of the weak verb; exegetical treatment of the book of Jonah. 3 s.h. (Note: 201-202 not credited separately.) *Bailey*

207. Second Hebrew. Historical Hebrew grammar with reading and exegesis of Old Testament prose. (Pentateuch and historical books in alternate years.) First semester. 3 s.h. *Wintermute*

208. Second Hebrew. Historical Hebrew grammar and rapid reading of prose and poetry. Second semester. 3 s.h. *Murphy*

209. Old Testament Theology. Studies of the Old Testament in regard to theological themes and content. Prerequisite: OT 11 or equivalent. 3 s.h. *Murphy*

223. Exegesis of the Hebrew Old Testament. Prerequisite: OT 201-202.

223A. *Amos and Hosea*. Interpretation based upon Hebrew exegesis, stress upon hermeneutical method. (Not offered in 1972-73.)

223B. *Job*. Exegesis of the book of *Job* in Hebrew. 3 s.h. *Murphy*

223C. *Exodus*. Exegesis of the book of *Exodus* in Hebrew. (Not offered in 1972-73.) 3 s.h. *Bailey*

237. History of the Ancient Near East. Emphasis upon the religions, literature and art of Mesopotamia. 3 s.h. *Bailey*

302. Studies in the Intertestamental Literature. Selected documents of the Apocrypha and Pseudepigrapha examined exegetically and theologically in their relation to post-exilic Judaism. Prerequisite: permission of the instructor. 3 s.h.

304. Aramaic. A study of the Aramaic portions of the Old Testament, and selected passages from later Aramaic texts. (Not offered in 1972-73.) 3 s.h. *Murphy*

304A. Targumic Aramaic. A study of selected portions of the Targums of the Old Testament. 3 s.h. *Meyers*

305. Third Hebrew. An interpretative study of late Hebrew prose, with readings from Chronicles, Ecclesiastes, and the Mishnah. 3 s.h. *Davies or Meyers*

306. Language and Literature of the Dead Sea Scrolls. A study in interpretation. Prerequisite: a knowledge of Hebrew. (Not offered in 1972-73.) 3 s.h. *Wintermute*

307. Syriac. A study of the script and grammar, with readings from the Syriac New Testament and other early Christian documents. Some knowledge of Hebrew and Aramaic is a prerequisite. (Not offered in 1972-73.) 3 s.h. *Charlesworth*

323A. Comparative Semitics. An introduction to the morphology and syntax of classical Arabic and the Semitic languages of Mesopotamia together with a consideration of their relationship to Hebrew. 3 s.h. *Wintermute*

323B. Comparative Semitic II. An introduction to the morphology and syntax of classical Ethiopic and the Semitic languages of Palestine-Syria together with a consideration of their relationship to Hebrew. (Not offered in 1972-73.) 3 s.h. *Wintermute*

350-351. Seminar in Old Testament. Research and discussion on selected problems in the Old Testament and related fields. 3 s.h. *Murphy*

373-374. Elementary Akkadian. Study of the elements of Akkadian grammar. Reading of Neo-Assyrian texts shedding light on the Old Testament. Prerequisite: Biblical Hebrew. (Not offered in 1972-73.) 6 s.h. *Bailey*

375-376. Elementary Ugaritic. Study of the elements of Ugaritic. Prerequisite: Biblical Hebrew. (Not offered in 1972-73.) 6 s.h. *Staff*

NEW TESTAMENT

18. introduction to New Testament Interpretation. An introduction to the literature of the New Testament with special attention to the perspectives and methods of historical-critical investigation and interpretation. 4 s.h. *Efrd or M. Smith*

103-104. Hellenistic Greek. Designed for beginners to enable them to read the Greek New Testament. 6 s.h. (Two sections.) *Efrd*

105. Studies in Paul. An investigation of Paul's apostolate based upon the Acts and the Epistles with attention to Paul's theology as reflected in selected passages. (Not offered in 1972-73.) 3 s.h. *Efrd*

116. Exegesis of the English New Testament I. A. Luke-Acts; B. Galatians; C. The Pastoral Epistles; D. I and II Corinthians. (NT 116A, B, C, and D are separate courses offered in different semesters. NT 116A, B, C, and D are not offered in 1972-73.) 3 s.h. *Staff*

117. Exegesis of the English New Testament II. A. The Gospel and Epis-

ties of John; B. Romans; C. Revelation; D. Mark. (NT 117A, B, C, and D are separate courses, offered in different semesters.) NT 117 A and D are not offered in 1973-74. 3 s.h. *Staff*

118. The New Testament in Greek. Readings in the Gospels. (Not offered in 1972-73.) 3 s.h. *Staff*

119. The New Testament in Greek. Readings in the Epistles. 3 s.h. *Staff*

225. Living Issues in New Testament Theology. Critical examination of major problems and issues in New Testament interpretation and theology. Prerequisite: 4 s.h. of NT or the equivalent. 3 s.h. *M. Smith*

226. Exegesis of the Greek New Testament I. A. Mark and Matthew; B. Romans; D. I and II Corinthians; E. Gospel and Epistles of John. (NT 226A, B, D, and E are separate courses, offered in different semesters. NT 226A and 226B will not be offered in 1972-73.) Prerequisite: NT 103-104. 3 s.h. *J. L. Price, M. Smith, or F. W. Young*

227. Exegesis of the Greek New Testament II. A. Luke-Acts; B. Galatians; C. The Pastoral Epistles. (NT 227A, B, and C are separate courses, offered in different semesters. NT 227B and 227C will not be offered in 1972-73.) Prerequisite: NT 103-104. 3 s.h. *J. L. Price, M. Smith, or F. W. Young*

258. Coptic. Introduction to the Sahidic dialect with selected readings from Christian and Gnostic texts. Prerequisite: at least one year of Greek. 3 s.h. *Wintermute*

311. Pharisaic Judaism in the First Century. A reading course in first-century Pharisaic Judaism. 3 s.h. *Davies*

312. Pauline Theology. Studies in aspects of Paulinism in the light of recent scholarship. (Not offered in 1972-73.) 3 s.h. *Davies*

314. Judaism and Christianity in the New Testament. A study of their interaction. (Not offered in 1972-73.) 3 s.h. *Davies*

319. The Gospel According to St. Matthew in Recent Research. 3 s.h. *Davies*

340-341. Seminar in the New Testament. Research and discussion on a selected problem in the Biblical field. 3 s.h. *J. L. Price and M. Smith*

345. The Epistle to the Hebrews in Recent Research. (Not offered in 1972-73.) 3 s.h. *Davies*

II. Historical Studies

CHURCH HISTORY

13. History of the Church to the Protestant Reformation. A survey through the fifteenth century in terms of spiritual genius, organizational development, great literature, and representative movements. 3 s.h. *Gillespie*

14. History of Modern European Christianity. A survey of the main currents in Reformation and post-Reformation church history. 3 s.h. *Steinmetz*

126. The English Reformation. The religious history of England from the

accession of Henry VIII to the death of Elizabeth I. Extensive readings in the English reformers from Tyndale to Hooker. 3 s.h. *Steinmetz*

137. Religious Leaders in Christian History. Representative leaders in the early and medieval church studied in relation to contemporary churchmanship. Prerequisite: C.H. 13. 3 s.h.

138. Great Books in Christian History. An intensive study of Augustine's *Confessions*, Thomas á Kempis' *Imitation of Christ*, Erasmus's *Complaint of Peace*, Luther's *Christian Liberty*, Calvin's *Instruction in Faith*, and Andrewes' *Private Devotions*. 3 s.h.

139. Methodism. A study of Methodist societies in England and the developing church in America as they gave rise to such historic issues as polity, education, division, and reunion. Prerequisite: C.H. 13-14. 2 s.h. *Baker*

140. The Rise of Methodism and the Anglican Background. The Methodist societies within the Church of England to the death of Wesley. Prerequisite: C.H. 13-14. 3 s.h. *Baker*

(Students are advised that either C.H. 139 or C.H. 140 will satisfy the United Methodist Discipline Requirement No. 344.)

141. The Classic Age of the English Hymn. See C.W. 141.

145. Orthodoxy, Pietism, Enlightenment. Problems in Protestant theology before Kant. Extensive readings in the classic dogmaticians of the Lutheran and Reformed traditions. 3 s.h. *Steinmetz*

187. Pre-Reformation Preaching. See C.W. 187.

236. Luther and the Reformation in Germany. The theology of Martin Luther in the context of competing visions of reform. 3 s.h. *Steinmetz*

329. The English Church in the Eighteenth Century. Studies of Christianity in England from the Act of Toleration, 1689, to the death of John Wesley, 1791. (Not offered in 1971-72.) 3 s.h. *Baker*

331. The Social Message of the Early and Medieval Church. A study of the social teachings and contribution of the Christian church prior to the Protestant Reformation. Prerequisite: C.H. 13. 3 s.h.

332. The Medieval Church. Outstanding characteristics of the medieval church, emphasizing theory, polity, institutions, sacraments, and worship. Prerequisite: C.H. 13. (Not offered in 1971-72.) 3 s.h.

334. Church Reformers and Christian Unity. The work of such reformers as Marsilius of Padua, William of Ockham, Jean Gerson, Pierre d'Ailly and Nicholas of Cusa in relation to ecclesiastical schism and the search for Christian unity through representative councils. Prerequisite: C.H. 13. (Not offered in 1971-72.) 3 s.h.

336. Christian Mysticism in the Middle Ages. Source studies, in historical perspective of such late medieval mystics as Bernard of Clairvaux, the Victorines, Ramon Lull, Meister Eckhart, Richard Rolle, Catherine of Siena, and Nicholas of Cusa. Prerequisite: C.H. 13. 3 s.h.

339. The Radical Reformation. Protestant movements of dissent in the sixteenth century. Special attention will be devoted to Müntzer, Carlstadt, Hubmaier, Schwenckfeld, Denck, Marpect, Socinus, and Menno Simons. 3 s.h. *Steinmetz*

344. Zwingli and the Origins of Reformed Theology. Source studies in the early Reformed tradition. 3 s.h. *Steinmetz*

HISTORICAL THEOLOGY

111. History of Early Medieval Doctrine. A study of basic Christian doctrine of the early and medieval church, with special emphasis on the doctrines of God, Christ, justification, and the sacraments. 3 s.h. *Gillespie*

120. Early Medieval Theology of Grace. A study of anthropological theology in the early and medieval church. 3 s.h. *Gillespie*

121. Early Medieval Theology of the Sacraments. A study of sacramental theology in the thought and practice of the early and medieval church, with special attention to Baptism and the Lord's Supper. 3 s.h. *Gillespie*

123. Readings in Historical Theology. In-depth studies of representative figures of the early and medieval church, such as Clement of Alexandria, Irenaeus, Cyprian, Boethius, Anselm, Bonaventure, Thomas Aquinas, or others. Prerequisite: C.H. 13-14. 3 s.h. *Gillespie*

125. Introduction to Ecclesiastical Latin. A study of grammar and readings pertinent to the Latin Middle Ages. 3 s.h. *Gillespie*

136. Theology of St. Thomas Aquinas. An examination of major theological themes in the *Summa Theologica*. 3 s.h. *Gillespie*

241. Problems in Reformation Theology. Prerequisite: Permission of the instructor. 3 s.h. *Steinmetz*

251. The Counter-Reformation and Development of Catholic Dogma. An advanced survey of the main trends in Catholic theology from the death of Ockham to the Second Vatican Council. 3 s.h. *Steinmetz*

260. Life and Thought of the Wesleys. A seminar on John and Charles Wesley and their colleagues in relation to English culture and religion in the eighteenth century. Prerequisite: Permission of the instructor. 3 s.h. *Baker*

261. The Theology of John Wesley. A study of the development and structure of Wesley's theology, with special reference to his doctrines of man and salvation. 2 s.h. *Richey*

308. Greek Patristic Texts. Critical translation and study of selected Greek texts illustrative of significant aspects of patristic theology and history from the second through the fifth century A.D. Prerequisite: permission of the instructor. 3 s.h. *F. W. Young*

313. The Apostolic Fathers. A study of the religious thought in the writings of the Apostolic Fathers. 3 s.h. *F. W. Young*

317. Seminar in the Greek Apologists. A study of the apologetic writings of the Greek Fathers in relation to the challenges of their contemporary world. Special attention will be given to leading protagonists of late Graeco-Roman culture, such as Celsus, Porphyry, Julian, *et al.* 3 s.h. *F. W. Young*

318. Seminar in the Greek Fathers. A study of selected topics from the Greek Fathers. 3 s.h. *F. W. Young*

338. Calvin and the Reformation in Switzerland. The theological development of John Calvin. A comprehensive examination of his mature position with constant reference to the theology of the other reformers. 3 s.h. *Steinmetz*

AMERICAN CHRISTIANITY

28. History of American Christianity. A consideration of the nature of Christianity in America and the history of its development. 3 s.h. *Henry*

199. The American Social Gospel. A study of Protestant social thought and action in America since 1865. 3 s.h. *Henry*

296. Religion on the American Frontier. A study of the spread of evangelical Christianity as a theological and cultural phenomenon of the American West. 3 s.h. *Henry*

377. Contemporary American Theatre and Evolving Theological Forms. An examination of creed and ritual implicit and explicit in contemporary American theatre, of stage, film, and television. 3 s.h. *Henry*

384. Religious Dissent in American Culture. History and significance of dissent in the theology and culture of America. 3 s.h. *Henry*

385. Religion in American Literature. A critical study of the meaning and value of religious motifs reflected in American literature. 3 s.h. *Henry*

395. Christian Thought in Colonial America. Exposition of the main currents in Protestant theology. 3 s.h. *Henry*

396. Liberal Traditions in American Theology. A study of the main types of modern religious thought, beginning with the theology of the Enlightenment. 3 s.h. *Henry*

397. Contemporary American Theology. A critical appraisal of major tendencies. 3 s.h. *Henry*

HISTORY OF RELIGIONS

158. Contemporary Non-Christian Religions. Critical consideration of contemporary conditions in major non-Christian traditions, with special reference to Hinduism, Buddhism, Islam, and African Religions. 3 s.h.

180. Religions of the Near East. Historical and theological introduction to the major indigenous traditions of the Near East, especially Zoroastrianism and Islam. 3 s.h. *Partin*

280. The History of Religions. A study of the methodology of the history of religions, the nature of religious experience and specific categories of religious phenomena. Permission of the instructor. 3 s.h. *Partin*

III. Theological Studies

CHRISTIAN THEOLOGY

32. Christian Theology. The major themes of the theology of the church. 4 s.h. *Cushman, Herzog, Langford*

100. Introduction to Black Theology. A critical analysis of the recent rise

of black consciousness in America and its significance in the theological preparation of the Christian ministry. 3 s.h.

108. Major Trends in Contemporary Theology. A study of recent developments in theology, such as non-religious theology, hermeneutic theology, and death of God theology, in the light of revelation and authority. 3 s.h. (Not offered in 1972-73.) *Herzog*

110. This Life and the Age to Come. Christian eschatology and the meaning of history in the light of God's triumph over sin, suffering, and death. 3 s.h. *Robinson*

112. The Doctrine of Atonement. An investigation of major traditions and motifs for the purpose of constructive contemporary restatement. 3 s.h. *Hall*

125. Theology and the Study of Man. A comparative study of representative theological and psychological interpretations of man's nature, predicament, and deliverance. 3 s.h. *Richey*

127. Contemporary Understandings of Man. A seminar on selected recent and current interpretations of human nature and the human situation. (Not offered in 1972-73.) 3 s.h. *Richey*

200. The Person and Work of Christ. The problem of knowledge of Christ and formulation of a doctrine of his work and person in the light of Biblical eschatology. Prerequisite: C.T. 32. (Not offered in 1972-73.) 3 s.h. *Cushman*

210. Contemporary British Theology. Selected problems in representative British theological writings after 1900. (Not offered in 1972-73.) 3 s.h. *Langford*

211. Authority in Theology. The idea and function of authority in theology. 3 s.h. *Langford*

212. The Doctrine of the Holy Spirit. A study of the person and work of the Holy Spirit. (Not offered in 1972-73.) 3 s.h. *Langford*

213. The Structure of Roman Catholic Thought. The main characteristics of Roman Catholic theology with consideration of possibilities and limitations in ecumenical conversation with Rome. Prerequisites: CH 13 and 14. (Not offered in 1972-73.) 2 s.h. *Herzog*

215. The Nature and Mission of the Church. Christian understandings of the church, Biblical, historical, contemporary, with a view toward ecumenical doctrinal construction. 3 s.h. *Hall*

216. Kierkegaard Studies. Critical examination of selected works. 3 s.h. *Robinson*

217. Theological Explorations. A seminar on contemporary theological issues, content to be designated by the Theological Division. 3 s.h. *Staff*

224. Conceptions of Man in Western Thought. An analysis and interpretation of important types of philosophical and theological theory. (Not offered in 1972-73.) 3 s.h. *Richey*

300. Systematic Theology. Method and structure of systematic theology, the doctrine of God, theological anthropology, and Christology. Prerequisite: CT 32 or equivalent. 3 s.h. *Herzog*

214. The Christian Doctrine of Salvation. Systematic exposition and re-statement of the historic faith of the Church in relation to representative secular alternatives of ancient and modern times. Prerequisite: C.T. 32 or equivalent. 3 s.h. *Cushman*

303. The New Hermeneutic and the Idea of History. A critical examination of key thinkers in present-day European systematic theology (Fuchs, Ebeling, Moltmann, Ott, and Pannenberg) in the light of Ernest Bloch's philosophy. Prerequisite: CT 32. (Not offered in 1972-73.) 3 s.h. *Herzog*

320. Hegel and Schleiermacher. A study of two makers of modern Protestant thought. (Not offered in 1972-73.) 3 s.h. *Herzog*

322. Nineteenth-Century European Theology. Protestant theology from Kant to Herrmann. 3 s.h. *Herzog*

325. Philosophical Theology. Theology, as the knowledge of God, considered in dialogue with selected pagan and Christian philosophers from Plato to Kant. Prerequisite: CT 32 or equivalent. 3 s.h. *Cushman*

328. Twentieth-Century European Theology. Critical examination of the thought of selected Protestant theologians from 1900 to 1950. Prerequisite: CT 32. 3 s.h. *Herzog*

372. Theology of Paul Tillich. An examination of Tillich's philosophical theology. (Not offered in 1972-73.) 3 s.h. *Robinson*

CHRISTIANITY AND CULTURE

20. Types of Religious Philosophy. Basic historical orientation of religious thought, especially in Western culture. 3 s.h. *Robinson*

102. Science and Biblical Theism. Presuppositions, method, and content of scientific knowledge in physics and biology in relation to creation and providence. 3 s.h. *Robinson*

229. Tragedy and Christian Faith. An analytical and constructive philosophical interpretation of the fundamental tragic dimensions of human life in the light of a Christian theological understanding. 3 s.h. *Robinson*

CHRISTIAN ETHICS

All courses in Christian Ethics numbered 200 or above require a prerequisite of ChE 33 or permission of the instructor; 300 level courses require permission of the instructor.

33. Christian Ethics. Theological assumptions, ethical principles, and their application to contemporary issues of Christian social policy. 3 s.h. *Beach, Lacy, H. Smith*

113. Contemporary Issues in Christian Morals. Constructive examination of selected areas of public and private morality. 3 s.h. *Beach or H. Smith*

115. Christian Social Action in the Local Church. Christian ethical principles, resources, procedures, and programs for pastoral leadership in parish social action. (Not offered in 1972-73.) 2 s.h. *H. Smith*

122. Moral Theology in the Nineteenth Century. Critical and comparative

examination of ethical theory as exhibited in the work of representative theologians. (Not offered in 1972-73.) 3 s.h. *H. Smith*

190. The Christian Critique of Communism. Analysis of and alternatives to the dynamic secular ideology from a religious standpoint. 3 s.h. *Lacy*

130. Seminar on Death and Dying. Critical consideration of biblical, legal, medical, and ethical perspectives. (Also listed as Biblical Studies 130.) Prerequisites: OT 11; NT 18. 2 s.h. *H. Smith, Bailey, and Others*

194. The Protestant Church and American Culture. Analysis from the perspective of Christian ethics of current problems in the interpenetration of Church and culture with explicit reference to the parish setting. (Not offered in 1972-73.) 3 s.h. *H. Smith*

292. Christian Ethics and International Relations. An examination of Christian attitudes toward such issues as war and peace, the rule of law, foreign aid, and human rights; and the Church's contribution to international policies and institutions. (Not offered in 1972-73.) 3 s.h. *Lacy*

333. Seminar: Marxist Ideology and Christian Faith. Comparative study of Communist and Christian doctrines of man, society, sin, history, ethics, and eschatology. (Not offered in 1972-73.) 3 s.h. *Lacy*

383. Moral Theology in the Twentieth Century. Critical and comparative examination of ethical theory as exhibited in the work of selected contemporary theologians. 3 s.h. *H. Smith*

388. Ethics and Medicine. A critical study of selected aspects of modern biomedical technology with special reference to the ethical assumptions informing their development and practice. (Not offered in 1972-73.) 3 s.h. *H. Smith*

389. Christian Ethics and Contemporary Culture. A study of the interaction between Christian thought and current secular social theory. Prerequisite: permission of the instructor. 3 s.h. *Beach*

390. Current Problems in Christian Ethical Theory. A critical study of dominant issues in Christian ethics: such as community, conscience, contextualism, power, and technology. 3 s.h. *Beach*

391. Historical Types of Christian Ethics I. A critical study of representative statements of Christian ethical theory through the early Reformation. (Not offered in 1972-73.) 3 s.h. *Beach*

392. Historical Types of Christian Ethics II. A continuation of ChE 391, from the Reformation through current Christian ethical theory. (Not offered in 1972-73.) 3 s.h. *Beach*

394. Christianity and the State. The relation of the Christian theory of the State to political problems with special consideration of the religious assumptions underlying democratic theory and practice, and of the relationship of the Church to the State. 3 s.h. *Beach*

WORLD CHRISTIANITY AND ECUMENICS

24. The Christian World Mission. A study of theological foundations, guiding principles, and contemporary problems of the World Christian Community. (Not offered in 1972-73.) 3 s.h. *Lacy*

133. The Expansion of Christianity. A survey of the spread of Christianity and the growth of the church with special emphasis on nineteenth and twentieth century Protestantism in the non-Western World. 3 s.h. *Lacy*

135. Area Studies of the Christian Church. The cultural setting and current programs and policies of the Church in one of the following areas: (a) Latin America, (b) India and Pakistan, (c) Africa, (d) Southeast Asia, (e) Japan-Korea-Philippines, (f) Moslem Lands, or (g) United States Home Missions. (One of these areas may be taken as an independent reading course, WC 399, when not offered as a seminar.) 3 s.h. *Lacy and Others*

156. The Ecumenical Movement. Its contemporary development, structures, activities, and problems, against the background of Church unity and disunity. (Not offered in 1972-73.) 3 s.h. *Lacy*

386. Seminar: Christianity in Dialogue with Other Faiths. Contemporary currents of Christian thought as they relate to resurgent non-Christian religions and involve new formulations of a theology of mission. 3 s.h. *Lacy*

See also: ChE 190, ChE 292, and ChE 333.

IV. Ministerial Studies

THE CARE OF THE PARISH

9. Church and Ministry I. Contemporary views of the nature and normative function of the Church in modern society and some implied conceptions of the ministry. (Course offered in three sections.) 2 s.h. *Beach, Cousin, and Langford*

10. Church and Ministry II. Exposure to and reflection upon various contexts of present-day Christian ministry with a view to integration of contexts with the work of the Church, its nature, and appropriate styles of ministry. 3 s.h. *Mickey*

146. Church Building. The role of the pastor in planning and executing building programs in the local church: architectural consideration and counsel, building requirements and plans. 2 s.h. *Nesbitt*

148. Christian Stewardship and Church Finance. A seminar to consider the principles of stewardship education, budget-making, enlistment in church support. 2 s.h. *Ingram*

150. Church and Community. The structure and dynamic factors shaping the present-day community together with their import for the work of the Church. (Not offered in 1972-73.) 2 s.h. *Wilson*

151. The Town and Country Church. The small church, the circuit church, circuit administration, larger parish and group ministry, and the Town and Country movement. 2 s.h. *Nesbitt*

152. Evangelism and the Local Church. A study of the nature, purposes, and methods of contemporary Christian evangelism with special attention to the local church. (Not offered in 1972-73.) 2 s.h. *Kale*

153. Comparative Polity and Ecumenics. A study of selected examples of church polity as represented in the Catholic and Protestant traditions in relation to present-day developments. 3 s.h. *Ingram*

154. The Urban Church. The function, nature, program, and administration of the effective city church and of the urban minister's distinctive task. 2 s.h. *Ingram*

155. A, B, C, D. Church Polity.

A. *The United Methodist Church.* A study of the history of Methodist government and contemporary polity. 3 s.h. *Ingram*

B. *The Baptist Churches.* 2 s.h.

C. *The United Church of Christ.* 2 s.h.

D. *The Presbyterian Churches.* 2 s.h.

157. The Church and Social Change. A sociological study of the relationship of the church to the process of social change, including the role of the church as innovator, the church as participant in social movements, method(s) of accomplishing change, and the religious leader as an agent of social change. 3 s.h. *Wilson*

159. The Church and Extremism. A study of extremist groups, including their ideology, activities, and methods of operation. Particular attention will be given to ways by which the congregation and clergyman can deal with such organizations in the local community. 2 s.h. *Wilson*

160. Church Administration. An introduction to the principles of church administration, supervised experience in parish settings, and reflection on selected case studies. 3 s.h. *Ingram*

179. A, B. Seminar on Church Research. Methods of research and survey for the gathering, analysis, and interpretation of church and community data, together with preparation and use of denominational statistics. 3 s.h. *Wilson*

189. The Multiple Staff Ministry. Group work, leadership and organizational theories as applied to staff ministries in large church and cooperative parish settings. (Not offered in 1973-74). 3 s.h. *Ingram*

CHRISTIAN EDUCATION

22. Faith and Nurture. Foundations in theology and educational theory for the teaching ministry of the Christian community. (Not offered in 1972-73.) 3 s.h. *Richey*

25. The Church and Christian Nurture. A constructive survey of the local church as a community of Christian nurture. Statement of evaluation of objectives, leadership and resource materials, structural patterns and administrative and supervisory procedures for the church school. 3 s.h. *Kale*

149. The Ministry to the Campus. An examination of the circumstances which have produced, and the unique problems which confront, the ministry on the campus, considered from the perspective of the Christian idea of higher education. (Not offered in 1972-73.) 3 s.h. *Staff*

161. Method in Teaching-Learning. Basic teaching procedures required by professional and lay workers in the local church. Opportunities are arranged for observation and guided practice. Usually required for candidates for the M.R.E. degree. 3 s.h. *Kale*

162. Curriculum Building in the Local Church. An examination of influential theories of and contemporary trends in curriculum construction, together with

an evaluation of existing curricula. Actual designing of short units for use in the local church. 3 s.h. *Kale*

164. Christian Education of Children. The organization and administration of the work of the church with preschool and elementary-age children. (Not offered in 1972-73.) 2 s.h. *Kale*

165. Christian Education of Youth. The organization and administration of the youth program in the local church. (Not offered in 1972-73.) 2 s.h. *Kale*

166. Christian Education of Adults. A study of the needs of adults, the materials, methods, and principles of organization for the Christian education of adults. (Not offered in 1972-73.) 2 s.h. *Kale*

167. Theology and the Laity. A study of contemporary lay movements and centers, the ministry and mission of the laity in Church and world, and the ministry of teaching in the lay renewal of the Church. 3 s.h. *Richey*

169. Major Issues in Christian Education. Critical examination of selected issues in Christian Education. 3 s.h. *Richey*

M.R.E. Thesis or Project. Required of all candidates for the Master of Religious Education degree. *Kale and Others*

PASTORAL PSYCHOLOGY

70. Group Process and Personal Identity. A small group experience to enhance personal growth and explore personal identity and interpersonal styles of relating. 2 s.h. *Staff*

170. Pastoral Conversation. A consideration of the nature of the pastor's conversation with people in his total caring ministry grounded in the person-centered understanding of personality processes and human relationships, using textual and conversational materials. 3 s.h. *Goodling*

171. Pastoral Counseling. Consideration of the structures and processes of pastoral counseling: pastoral evaluation, referral, intake, contract, goals, transference, termination, and other special problems. Prerequisite: PP 177. 3 s.h. *Staff*

172. Pastoral Care in Marriage and Family Life. Pastoral care in marriage and family life with special emphasis on premarital guidance within the context of the local church's program of family life education. 3 s.h. *Goodling*

173. Psychotherapy and Sanctification. An analysis of structuring and growth processes in psychotherapy in the light of a Christian understanding of sanctification. (A research seminar. Open to seniors and Th.M. students, by permission of the instructor.) 3 s.h. *Mickey*

174. Religion and Personality Processes. Psychological and religious interpretation of man's basic experiences; personality factors in religious development; psycho-dynamic meanings and uses of religious beliefs and practices. Prerequisite: PP 170. (Not offered in 1972-73.) 3 s.h. *Goodling or Mickey*

175. Special Practicum Projects. For advanced students who want additional clinical experience under supervision in a pastoral care setting (inner-city; alcoholic rehabilitation; counseling; etc.) *Staff*

***176. A, B, C, D. Pastoral Care and Persons in Institutions.**

A. Lectures by staff and ward visits at the Dorothea Dix State hospital in Raleigh (and related facilities: Alcoholic Rehabilitation). (Not offered in 1972-73.) 3 s.h. *Staff*

B. Lectures by staff and ward visits at the Murdoch Center for the Mentally Retarded and other facilities in the Butner, North Carolina complex (State Hospital, Alcoholic Rehabilitation, Training School). 3 s.h. *Staff*

C. Lectures by staff and ward visits at the Central Prison in Raleigh (and related correctional facilities). 3 s.h. *Staff*

D. The church's ministry to the elderly and homebound explored through lectures, case conferences, and visits to the elderly and homebound parishioners of local Durham churches. (Not offered in 1972-73.) 3 s.h. *Goodling*

***177. Pastoral Care in the General Hospital Setting.** An examination, through intensive individual and group supervision, of the student's pastoral ministry to the ill, the dying, and the bereaved in the general hospital setting. Prerequisite: P.P. 170. 3 s.h. *Staff*

178. Power and Restraint in the Parish. An analysis of psychopolitical dynamics of the local church. Open to juniors with consent of the instructor. 3 s.h. *Mickey*

271. Advanced Counseling: Marriage and Family. The psychodynamics of marital conflict and family problems; principles and procedures in marriage and family counseling. (For Th.M. candidates.) 2 s.h. *Staff*

273. Problems of Methodology in Pastoral Theology. An investigation of problems in relating materials from theology and personality disciplines as they are found in pastoral theology, with a view toward the development of a consistent methodology. (Prerequisite: PP 173 and permission of instructor.) 3 s.h. *Mickey*

274. Research Problems in Pastoral Psychology. Research methods and areas of investigation in pastoral psychology. 2 s.h. *Goodling*

275. Individual Study in Pastoral Psychology. Selected readings in major issues in pastoral psychology issuing in a research or honors paper. 2 s.h. *Staff*

277. A, B, C. Clinical Pastoral Education. CPE in accredited training centers.

A. Summer Quarter of CPE. 4 s.h.

B. Fall Semester of CPE. 4 s.h.

C. Spring Semester of CPE. 4 s.h.

278. Psychological Theories of Personality. Systematic review of personality theories (psychoanalytic, social psychological, organismic, existential self-theory) with special reference to their relevance for the pastoral ministry. 2 s.h. *Staff*

279. The Caring Ministry of the Laity Through Personal Groups. Personal experience in a group counseling process to develop a methodology for training lay leadership in the ministry of pastoral care through group experience. 2 s.h. *Staff*

*The Pastoral Psychology Staff suggests that a student elect no more than one of the institutional courses (176A, B, C, D, or 177). Students interested in institutional training beyond one such course are encouraged to apply for a CPE quarter.

281. A, B. Pastoral Counseling Practicum. Individual and group supervision of several types of pastoral counseling with people in different crisis and growth situations. The student will be working part time as a minister of counseling in a local church situation. Admission by permission of the instructor. 4 s.h. *Staff*

282. A, B. Pastoral Psychology Literature Seminar. Critical and constructive reviews of pertinent literature in the field (Th.M. students only.) A full-year course. 2 s.h. *Mickey*

THE CHURCH AT WORSHIP

34. Workshop in Communication. Intensive drill in voice, diction, speaking, and reading. Enrollment by recommendation by teaching faculty. 1 s.h. *Rudin*

PREACHING

30. Theory and Practice of Preaching. The development of a theory of preaching and methods of sermon construction, including clinical experience in preaching sessions and local church settings. 3 s.h. *Hall*

181. Advanced Sermon Analysis Seminar. A critical study, on the basis of selected sermons and student presentations, of principal and practical problems facing the contemporary preacher. 3 s.h. *Carlton or Hall*

183. Preaching in Context. An analysis of preaching done in the context of the Black religious experience based on audio-video-taped sermons and observations done by students. 2 s.h. *Cousin*

185. Preaching Values in Non-Biblical Sources. A critical examination of select samples of contemporary drama, poetry, and fiction, for homiletical purposes. 3 s.h. *Hall and Staff*

186. Twentieth-Century Preaching. A study of contemporary preaching based on printed, recorded, audio- and video-taped sermons of leading homileticians of our age. 3 s.h. *Hall*

187. Pre-Reformation Preaching. Sermons, handbooks, and other historical sources studied in relation to Biblical preaching and the liturgical church, the problem of popular ministry and the issues of Christian reform. Prerequisite: CH 13. (Not offered in 1972-73.) 3 s.h. *Staff*

188. Post-Reformation Preaching. A study of the theological trends and significant personalities in the preaching tradition from the sixteenth century to the present. (Not offered in 1972-73.) 3 s.h. *Carlton*

184. New Forms of Worship. Workshop in corporate worship as central in the liturgical life of the Church, and of both traditional and innovative means of communication, celebration, and witness, through shared experiences in multi-media center, field visits, and mini-workshops with resource persons in the various media. 3 s.h. *Rudin and Others*

192. Homiletical Authenticity and the Communications Arts. A study of recent developments in the understanding of communications media and the arts with a view to identifying significant contributions to homiletical theory and practice. (Not offered in 1972-73.) 3 s.h. *Hall*

193. Theology and Preaching. An examination of the relation of systematic theology and homiletical presentation. 3 s.h. *Hall*

196. Pastoral Preaching. A field related course designed to help students presently serving as student pastors develop their vision of, commitment to, and skills for the week-by-week ministry of preaching in the parish setting. (Not offered in 1972-73.) 3 s.h. *Hall*

WORSHIP AND CHURCH MUSIC

134. Liturgical Reading. Practice in reading the liturgical materials of the pastoral ministry: Scriptures, prayers, and the rites and services in the Methodist *Book of Worship*. 2 s.h. *Rudin*

141. The Classic Age of the English Hymn. Eighteenth century development of the English hymn with special reference to Watts and the Wesleys, their precursors and successors. (Not offered in 1971-72.) 2 s.h. *Baker*

178. Corporate Worship. Study of the liturgical life of the church, celebrated in sacraments, worship, and the church year. Field experiences and vocational application of theory. 3 s.h. *Rudin*

179. Seminar in Corporate Worship. Study of the liturgical life of the church, resources for its celebration, and leadership in the parish setting. Primarily for student pastors and associates. 3 s.h. *Rudin*

180. Church Music. A two-fold study including: (1) a survey of the great monuments of church music; (2) musicianship, songleading, and basic conducting; with an emphasis upon the selection and use of hymns and other music, from the *Methodist Hymnal*, in public worship. 3 s.h. *Hanks*

182. Chapel Choir. Students who successfully complete CW 180 before graduation may qualify for credit (to the limit of 2 s.h.) of ½ s.h. for each semester of effective participation in the Chapel Choir. Choir membership (granted by audition) affords opportunity for study of the history and background of church music, and practical consideration of it in the context of public worship. *Hanks*

Field Education Projects, Clinical Training, and Internships

Field Education Projects. Each project involves the quality of preparation and participation commensurate with one semester hour of academic credit. Participation in any project must have the approval of the supervising professor and the Field Education Office before work is begun. Registration for projects must be at the time of normal Divinity School registration, though work on the project may extend over varying lengths of time. A student may receive credit for a maximum of three projects during his seminary career. Projects in other areas may be proposed by professors or students for consideration by the Field Education and Curriculum Committees.

195. A, B, C, D, E, F, G, H. Field Education Projects.

A. Pastoral Psychology Practicum. Small group seminar to explore personal and professional identity and role performance based on written reports of field encounters. Enrollment limited to students currently engaged in field work situations with separate seminars for student pastors and student assistants. 1 s.h. *Staff*

B. *Community Studies*. Planning and execution of a community religious census, church and community survey, or field research study in consultation with the faculty supervisor. Includes background reading, planning sessions, use of volunteer help where needed, tabulation, interpretation, and overall evaluation. 1 s.h. *Staff*

C. *Leadership Training*. Preparation, teaching, and evaluation of a leadership training course under faculty supervision in collaboration with denominational boards of education. Can be taught in any field location approved by faculty supervisor. 1 s.h. *Kale and Staff*

D. *Christian Education Laboratory*. Controlled educational experience in a local church setting, under supervision, approximating 28-32 hours of participation in planning, leading, observing, and evaluating actual teaching-learning projects related to specific age groups. (Not offered in 1972-73.) 1 s.h. *Kale and Staff*

E. *Research in Experimental Ministries*. Assembling data and preparing papers for the use of groups engaged in specialized urban ministries. 1 s.h. *Ingram and Staff*

F. *Community Center Practicum*. Seminar to assist students to integrate work and learning experiences in a community center and to develop a vocational style which displays special relevance for ministry in an inner-city neighborhood. Enrollment limited to those currently engaged in community center experiences. 1 s.h. *H. Smith and Staff*

G. *Sermon Preparation Seminar for Student Pastors*. Designed to assist student pastors in the week-by-week work of sermon preparation and presentation. 1 s.h. *Hall*

H. *Seminar in Leadership of Corporate Worship for Student Pastors and Associates*. To assist in week-by-week planning and leading. 1 s.h. *Rudin*

CLINICAL TRAINING IN PASTORAL PSYCHOLOGY

1. Clinical credit may be allowed to students for a quarter (10 or 12 weeks) of training in programs accredited by the Association for Clinical Pastoral Education (ACPE).

2. Credit for clinical training in programs not accredited by ACPE will be on an individual basis only upon the recommendation of the Director of Programs in Pastoral Psychology and approval of the Dean.

3. Students involved in clinical training under the direct supervision of members of the pastoral psychology staff shall register for credit under PP 277A for 4 semester hours of credit.

4. Students involved in clinical training in other programs shall register with the ACPE and upon receipt of a supervisor's report at the end of the training period will receive 4 s.h. of transfer credit.

5. Grades for clinical training are to be reported as either P or F.

INTERNSHIPS

Interseminary Church and Society

The Interseminary Church and Society Program is an experiment in the theological education of students, professors, and leaders in some of the major institu-

tions of our time. Sponsored jointly by Duke Divinity School, Union Theological Seminary in Virginia, and Virginia Theological Seminary, the Program currently permits students to enroll for an academic year in residence at one of the participating schools and to undertake work and study in business and industry, government and politics, science and technology or urban affairs. Major features of the program include specific job placement, professional and academic supervision, and regular seminars and colloquia. For further information concerning this Program, consult the Director of Field Education.

ChE 131-132. Interseminary Intern Seminar. Development and personal projection of a style of special ministry through understanding, appreciation, involvement in and critical reflection upon environment, structures, values, and decision-making processes in (a) business and industry; (b) science and technology; (c) government and politics; (d) urban affairs. 9 s.h. *H. Smith and Others*

Other Internships

C.P. 143-144. Campus Ministry Internship. A nine- to twelve-month position in approved locations designed to provide professional experience, under qualified guidance, in ministering to college students. Academic seminars, a personal journal, directed readings, and evaluative reports will aid the intern in clarifying his vocational choice and professional identity as a campus minister. Open to students who have completed at least two full years of seminary and who seriously contemplate a ministry to the campus following graduation. 3 s.h. each semester. (Placement arranged through the Office of Field Work Placement.)

197-198. World Mission Internship. Where work assignments can be arranged by the student, in relation to the United Methodist Board of Missions or other agencies, academic credit may be earned through directed reading, evaluation reports, and supervised field experience. Designed to enrich personal and professional growth through study and involvement in the actual context of mission, the program may involve from one to three years of national or overseas service, ordinarily between middler and senior years. 6 s.h. *Lacy*

(Other internships in the local church and specialized ministries may be arranged in consultation with the Director of Field Education with the approval of the Educational Affairs Council.)



Appendix

DEGREES CONFERRED AT COMMENCEMENT, 1971

Master of Divinity

Kay D. Alger
Robert L. Alger
James Grant Allred, Jr.
Joseph David Bailey
Joan Ruth Barclay
Katherine Ann Belton
Keith Bretch Binkley
John Treadway Brogdon, Jr.
Jerry Dean Campbell
Harold Eugene Cato
Kenneth Ray Channell
Keith Charles Chappell
James Lester Clark
James C. Cooper
M. Elizabeth Coulbourn
Roger Dale Cyr
Robert Vess Dodd
Steven Elliott Dorsey
Roger Vernon Elliott
Bary Richard Fleet
Richard Alan Fisher
Jamie Tarpley Fonville, Jr.
Julie Bethel Forringer
Charles Joel Fowler
Clarence Garner
William Hughes Gattis
Clifford Anthony Geers, Jr.
William Frederic Gerhardt
James Huntley Grayson
Robert Lee Grigsby
John Harvey Halbrook
Andrew Martie Hall, Jr.
William L. Hoffman
Thomas Given Holtsclaw
Frederic Michael Hooper
John Scott Horner
Charles Rayford Humphries, Jr.
James Mason Jarvis
Charles Louis Kammer, III
David Gerald Kelley
C. Horger Knight
James M. Leatherwood
Dennis Ray Lee

Henry Neal Lovelace
Martha Ellen Loyd
Richard Frederick McCleery
Robert Marshall McConathy, III
John Samuel McMillan
Kathryn Lucile Mitchem
William Doverspike Mullen
Karl Arthur Netting
Harvey Knupp Newman
Barry Phillip Osborne
John Jay Peel, Jr.
Walker Pettyjohn
James Robert Reeves
Richard Alan Rintamaa
Blase Dale Sands
James Stephen Sapp
Sheryl Lou Scrimsher
Rutledge Dantzler Sheridan, Jr.
Mark Robinson Sills
Roger Lee Smith
Wolfgang F. Stolz
Bruce Davis Taylor
Rutledge Tufts, Jr.
Fred L. Umberger
Charles Ray Vaughan
Thomas Ronald Vaughan
Harold Gene Wallace
Dann R. Ward
Randolph Phillip Waugh
Patrick Paul Welch
Jane Kieser White-Stevens
Charles Patrick Williams
Richard Keith Williams
Benjamin Franklin Wilson
Victor Otis Wilson, Jr.
Lorris May Wimberly, Jr.
Dennis R. Winkleback
James Hershel Wiygul
Charles William Wolfe
Harmon Lee Wray, Jr.
George Khatchik Yacoubian
Thomas Sidney Yow, III

Master of Theology

Robert Fleming Brown
Noel Leo Erskine
Ronald Ferguson
J. Edwin Heathcock
Basil Kustodowicz
L. Powers McLeod, Jr.
Russell Earl Martin
Paul Charles Morrison

Willard Winston Olney, III
David Alan Pacholke
James Preston Sample, III
James Richard Squire
Robert Earl Stillwell
William Denver Stone
William Dalton Tallevast
Robert Louis Wallace

Master of Religious Education

Rebecca Clark White Adams

Samuel G. Dodson, Jr.

ENROLLMENT 1971-72

Candidates for the Master of Divinity Degree

Adkins, David William (B.A., Furman University), Pelzer, South Carolina
Adkins, Lowell Earl (A.B., Marshall University), Huntington, West Virginia
Aiken, Michael Lee (B.S., Wake Forest University), Greenville, North Carolina
Aitcheson, Archie Brian (A.B., Elon College), Watertown, Connecticut
Allen, Arthur Lewis (B.A., Simpson College), Tingley, Iowa
Allen, Nancy Lee (B.A., Simpson College), Stuart, Iowa
Armstrong, William Henry, Jr. (B.A., Union College), Durham, North Carolina
Bailes, James Robert (B.S., University of Tennessee), Knoxville, Tennessee
Baldwin, M. Winston, Jr. (B.A., Georgetown College), Roanoke, Virginia
Barfield, Warren Clark (A.B., University of North Carolina), Raleigh, North Carolina
Barnhardt, Roland Taylor (A.B., Duke University), Winston-Salem, North Carolina
Baucom, Burvin Lee (B.A., Western Carolina University), Reidsville, North Carolina
Biazo, Harold D. (B.A., University of Arkansas), Fayetteville, Arkansas
Blomquist, Albert George (B.A., Wofford College), Greenwood, South Carolina
Bolick, Lawrence (A.B., Catawba College), Newton, North Carolina
Bowie, William Keith (B.A., Furman University), Ware Shoals, South Carolina
Boyd, Charles Lane (B.A., McMurry College), Dumas, Texas
Braswell, William Edward (A.B., M.A.T., University of North Carolina), Winston-Salem, North Carolina
Brookshire, Joseph William (B.S., University of Georgia), Mebane, North Carolina
Brown, Alton Theoran (B.A., Baylor University; Union Theological Seminary), Riverside, California
Brown, Darrell Richard (B.S., Duke University), Oklahoma City, Oklahoma
Brown, Michael Bruce (A.B., High Point College), Asheboro, North Carolina
Brunson, Jerry (B.A., Pembroke State University), Latta, South Carolina
Burgess, Charles Nathan (B.A., North Carolina Wesleyan), Graham, North Carolina
Burnside, Hobert William, Jr. (B.A., Pembroke State University), Branch, North Carolina
Byers, Leonard C., II (B.A., North Carolina State University), Mooresville, North Carolina
Caple, William Joseph (B.A., Georgetown College; United Theological Seminary), New Albany, Indiana
Carter, James Joel (B.S., University of North Carolina), Candler, North Carolina
Cash, Michael Thomas (B.A., Campbell College), Cary, North Carolina
Chalker, Kenneth (B.A., Mount Union College), Brookfield, Ohio
Champion, Buddy Joe (B.A., Limestone College), Gaffney, South Carolina
Chappell, Lynn (B.S., Eastern Michigan University), Saginaw, Michigan
Chitwood, Paul (B.A., Centre College of Kentucky), Louisville, Kentucky
Clark, Ernest James, Jr. (B.A., Lenoir Rhyne College; M.A., University of North Carolina), Newton, North Carolina
Clifton, Larry Bruce (A.B., University of North Carolina), Charlotte, North Carolina
Cline, Janice Dianne (B.A., University of North Carolina), Belmont, North Carolina
Clodfelter, Benjamin Carl (A.B., Pfeiffer College), Thomasville, North Carolina
Cook, Raymond Williamson (B.S., A&T State University), Manson, North Carolina
Coolidge, William McCabe (B.A., M.B.A., Michigan State University; Virginia Theological Seminary), Marshall, Michigan
Corriher, Arnold Douglas (A.B., Duke University), Marion, North Carolina
Coyner, Michael J. (B.A., Purdue University), Anderson, Indiana
Craig, William Mark (B.A., Austin College), Ft. Worth, Texas
Crawford, Norwood Rex (B.A., University of South Alabama), Mobile, Alabama
Culbertson, Sue Ann (A.B., Marshall University), Huntington, West Virginia
Currie, William C. (A.B., Pfeiffer College), Rockwell, North Carolina
Davis, Charles Thomas (B.A., University of North Carolina), New Bern, North Carolina
Davis, Donna Marie (B.A., Methodist College), Raleigh, North Carolina
Douthat, James Evans (A.B., College of William & Mary), Petersburg, Virginia
Draeger, John H. (B.A., Washington and Lee University), Arlington, Virginia
Dulaney, Earl George (B.S., University of Cincinnati), Dayton, Kentucky
Dunbar, Walton Charles (A.B., Southwest Louisiana State University), Opelousas, Louisiana
Eason, William Alfred (B.A., University of Arkansas), Little Rock, Arkansas
Eller, James Norman (B.S., Mars Hill College), North Wilkesboro, North Carolina
Emerson, Phillip Royce (A.B., Adrian College), Auburn, Indiana
Errington, Joe Richard (B.A., Howard Payne), McAllen, Texas

Etherton, Rayford Lee (B.A., University of Alabama), Fort Payne, Alabama
 Fauber, Gilmer Davis, Jr. (B.A., Georgetown College), Clifton Forge, Virginia
 Ferguson, Don E. (B.S., University of Tennessee), Knoxville, Tennessee
 Ferguson, Frederick A. (B.S., Tennessee Tech University), Knoxville, Tennessee
 Field, Paul C. (B.A., Yale University), Ormond Beach, Florida
 Finnin, William Martin, Jr. (B.S., Centenary College of Louisiana), New Orleans, Louisiana
 Flintom, Jack Glenn (A.B., Mercer University), Toccoa, Georgia
 Flynn, Robert Clark (B.A., Methodist College), Roxboro, North Carolina
 Forbes, Joseph Wayne (B.S., University of Arkansas), Popular Bluff, Missouri
 Freeman, Henry (B.A., Wofford College), Rockhill, South Carolina
 Fulmer, Cecil George (A.B., Newberry College), Newberry, South Carolina
 Godwin, James Badger, Sr. (B.A., University of Virginia), Sanford, Virginia
 Gray, Stephen Collinson (B.A., Middlebury College), Holden, Massachusetts
 Green, Carey Bradford (B.A., Southwestern University), Monteague, Tennessee
 Greenawalt, Robert Lester (B.S., Virginia Polytechnic Institute), New Castle, Virginia
 Gregory, David Alexander (B.A., Campbell College), Salisbury, North Carolina
 Gregory, Kemp D. (B.A., St. Andrews College), Durham, North Carolina
 Grosch, William Neil (B.S., Albright College; M.D., Albany Medical School; Union Theological Seminary), Syosset, New York
 Guest, John Michael (B.A. University of North Carolina), Greensboro, North Carolina
 Gum, Donald (B.A., Greensboro College), Graham, North Carolina
 Gunter, Edward M. (B.A., North Carolina Wesleyan), Orlando, Florida
 Haas, William Melvin (A.B., University of South Alabama), Mobile, Alabama
 Hamlin, Nat, Jr. (A.B., LaGrange College), Lizella, Georgia
 Hansis, Jeffrey Louis (B.A., Elon College), Stoneham, Massachusetts
 Hanson, Alan Jay (B.A., Adrian College), Saginaw, Michigan
 Harbour, Alvin Norris, Jr. (B.A., University of South Alabama), Mobile, Alabama
 Harris, Fletcher Edward (B.S., A&T State University), Winston-Salem, North Carolina
 Harris, James, Jr. (A.B., East Carolina University), Farmville, North Carolina
 Hathcock, Philip Loyce (B.A., University of Arkansas), Fayetteville, Arkansas
 Hawkins, Ronald Bruce (A.B., College of William & Mary), Richmond, Virginia
 Helton, Charles Lee (B.A., Johnson C. Smith University), Charlotte, North Carolina
 Hendricks, Dan L. (B.A., DePauw University), Evansville, Indiana
 Hendricks, John Richard (B.M.E., Mount Union College), Scio, Ohio
 Henry, Andrew Lee (B.S., Mississippi State University), Baldwin, Mississippi
 Herring, John George (B.A., Averett College), Kenbridge, Virginia
 Hill, William Bailey (B.A., Western-Maryland College), Dayton, Maryland
 Hobeika, George Lee (B.A., Furman University), Florence, South Carolina
 Holder, Linda Carole (A.B., Duke University), Charlotte, North Carolina
 Holland, Sherrill (A.B., University of North Carolina), Statesville, North Carolina
 Holliday, Boyd Marshall (A.B., University of North Carolina), Brevard, North Carolina
 Hudgins, Morris Wayne (A.B., Central Methodist College), St. Louis, Missouri
 Hutcherson, Ernest Keith (B.A., Wake Forest University), Winston-Salem, North Carolina
 Jester, Cecil Gene (B.A., Ouachita University), Irving, Texas
 Johnson, Carl S. (B.S., University of North Carolina), Gastonia, North Carolina
 Johnson, Joseph (B.A., North Carolina State University), Southern Pines, North Carolina
 Jones, Farris Jay (A.B., Duke University), Jacksonville, Florida
 Jones, Preston Carston (B.S., Livingstone College), Red Springs, North Carolina
 Jones, Steven Hillary (B.S., Hanover College), Kitty Hawk, North Carolina
 Jordan, David Michael (A.B., Duke University), Lake Junaluska, North Carolina
 Joyce, Thomas Lee (B.A., Emory and Henry College), Martinsville, Virginia
 Junk, Daryl Robert (B.A., Illinois Wesleyan University), Bloomington, Illinois
 Keel, Philip Wayne (B.A., North Carolina Wesleyan College), Robersonville, North Carolina
 Kendrick, Schaefer Bryant, Jr. (A.B., Washington & Lee University), Durham, North Carolina
 Kennedy, James Keith (A.B., Duke University), Tucker, Georgia
 Kerr, Robert Lowell (A.B., Florida Southern College), Mebane, North Carolina
 Kersey, Clinton W., Jr. (B.A., Furman University), McLean, Virginia
 Keyworth, Richard Briggs (A.B., Brown University), Gardner, Massachusetts
 Klausing, Robert Granruth (A.B., Centre College), Baltimore, Maryland
 Lane, Barry William (B.A., Florida Southern College), Jacksonville, Florida
 Lee, Billy Franklin (B.S., Pembroke State University), Hamlet, North Carolina
 Lee, Don Paul (B.S., Auburn University), Charlotte, North Carolina
 Lee, James Carroll (B.S., Campbell College), Coats, North Carolina
 Leeland, Paul (B.A., North Carolina Wesleyan College), Washington, D. C.

Lenox, Roy Everette, Jr. (B.A., Grinnell College), Levittown, New York
 Link, Peter George (B.A., University of North Carolina), Cherryville, North Carolina
 Lipphardt, John William, Jr. (B.A., West Virginia University), Wheeling, West Virginia
 Lockman, John Wesley (A.B., High Point College), Lincolnton, North Carolina
 Long, Charles Franklin, II (B.A., Texas Wesleyan College), Cleburne, Texas
 Lucas, Arthur Monroe (B.A., University of Virginia), Fairfax, Virginia
 McCall, Dwight Lynn (B.A., Furman University), Hiawassee, Georgia
 McClelland, Lloyd Clyde (B.A., Florida Southern College), Snow Camp, North Carolina
 McClung, James Andrew (B.A., Emory and Henry College), Stem, North Carolina
 McCullough, James d'Alvigny (A.B., Duke University), Honea Path, South Carolina
 McDavid, Robert Neil (B.A., Huntingdon College), Efland, North Carolina
 McKeown, Robert Eugene (B.S., Furman University), Chester, South Carolina
 Manchester, Harvey, Jr. (B.A., University of Delaware), Wilmington, Delaware
 Markham, Talmadge Thomas, Jr. (B.A., Lynchburg College), Boydton, Virginia
 Martin, Elbert Garrett (A.B., Duke University), Raleigh, North Carolina
 Martin, John Trenton, Jr. (B.M.E., Westminster Choir College; M.M.E., University of Colorado),
 Denver, Colorado
 Medlin, Charles Edward (B.F.A., Western Carolina University), Charlotte, North Carolina
 Medlin, William Tracy, III (A.B., Pfeiffer College), Greensboro, North Carolina
 Miller, Carol Ann (B.S., State University of New York at Albany), Pine Plains, New York
 Miller, Harold Dan, Jr. (B.A., Wake Forest University), Winston-Salem, North Carolina
 Miller, John Dale (A.B., Grove City College), Seneca, Pennsylvania
 Mobley, George Melton, Jr. (A.B., University of Florida), Orlando, Florida
 Morgan, Marvin Louis (A.B., Elon College), Burlington, North Carolina
 Morgan, Steven Douglas (A.B., Wofford College), Pickens, South Carolina
 Mosher, Charles Jon (B.A., Mount Union College), Pittsburgh, Ohio
 Moss, Victor Morgan, Jr. (B.A., Randolph-Macon College), Skipwith, Virginia
 Mount, Darrell Eugene (B.S., M.S., Louisiana Technical University; Ph.D., Tulane University),
 Lisbon, Louisiana
 Newsome, Clarence Geno (A.B., Duke University), Ahoskie, North Carolina
 Nolan, Thomas James (A.B., LeMoyne College; M.A., Colgate University), Waverly, New York
 Noseworthy, James Arthur (B.A., Simpson College), Reading, Massachusetts
 Noyes, David Carey (B.S., Union College), Scranton, Pennsylvania
 Owen, Paul Scott, Jr. (A.B., High Point College), High Point, North Carolina
 Patten, Walter Read (B.S., University of North Carolina), Mt. Olive, North Carolina
 Perry, Randall Krieg (B.A., Iowa Wesleyan College), Macomb, Illinois
 Peters, John Brandon (B.A., Randolph-Macon College), Charlottesville, Virginia
 Pollard, William Frank, Jr. (B.A., Center College; M.A., Duke University), Prospect, Kentucky
 Polderman, Ronald Lee (B.A., College of Wooster), Hewitt, New Jersey
 Poole, Forrest Clark (A.B., Pfeiffer College), Shelby, North Carolina
 Potter, Michael Roy (A.B., Princeton University), St. Albans, West Virginia
 Potts, Michael Dan (B.A., Oklahoma City University), Woodward, Oklahoma
 Powell, Daniel Nelson (B.A., University of Houston), Houston, Texas
 Privette, William Edward (B.A., Atlantic Christian College), Mebane, North Carolina
 Quiett, Harry Vernon (B.A., Mars Hill College), Asheville, North Carolina
 Ramsey, George William, III (A.B., High Point College), Asheville, North Carolina
 Rast, John Wesley (A.B., University of Georgia; Southern Baptist Theological Seminary),
 Atlanta, Georgia
 Reuthinger, Gary Michael (B.A., State University of New York at Albany), Somerville, New
 Jersey
 Rice, Joe Crosby (B.A., Centenary College of Louisiana), Shreveport, Louisiana
 Richardson, James, Jr. (A.B., Virginia Seminary and College), Martinsville, Virginia
 Ridenour, Allen Clyde (A.B., West Virginia University), Fellowsville, West Virginia
 Roberts, Donald Hayse (B.A., Lynchburg College), Hampton, Virginia
 Roberts, Laurie Charles (B.A., Colgate University), Camp Hill, Pennsylvania
 Robinson, Russel Lee (B.A., University of North Carolina), Boone, North Carolina
 Robinson, William Cullens (A.B., East Carolina University), Butner, North Carolina
 Rowland, James Halsey (B.A., Methodist College), Rustburg, Virginia
 Ruggles, Gordon William (A.B., Ashland College; Ashland Theological Seminary), Durham,
 North Carolina
 Ruth, John William (B.A., Mars Hill College), New Castle, Delaware
 Rutherford, Stephen Paige (B.A., Carson-Newman College), Bristol, Tennessee
 Rutledge, David Whitt (A.B., College of William and Mary), Newport News, Virginia
 Rutledge, Larry Wayne (A.B., University of North Carolina), Charlotte, North Carolina

Sanders, Gerald Martin (B.A., East Tennessee State University), Burlington, North Carolina
 Sandusky, Paul Allen (B.A., Denison University), Pittsburgh, Pennsylvania
 Segin, James Edward (B.S., Nebraska Wesleyan University), Brookfield, Illinois
 Settle, Charles Thomas (B.S., Arkansas A&M College), Little Rock, Arkansas
 Seymour, Joseph Cyril (A.B., Greensboro College), Salisbury, North Carolina
 Shuman, Donald Lee (A.B., University of North Carolina), Swannanoa, North Carolina
 Shuttlesworth, Gerald L. (A.B., West Virginia University), Morganton, West Virginia
 Simmons, Stanley Elbert (B.A., McMurry College), Nolan, Texas
 Smith, Kennard Craig (B.A., University of Alabama), Holt, Alabama
 Smith, Robert Cowan (B.S., University of Tennessee), Knoxville, Tennessee
 Stalfa, Frank Joseph, Jr. (B.A., Florida Atlantic University; Southern Baptist Theological Seminary), Boynton Beach, Florida
 Staton, Jesse Cluman, Jr. (B.A., Methodist College), Fayetteville, North Carolina
 Steele, David Lee (A.B., Duke University), Salisbury, North Carolina
 Stevens, Kathryn Elizabeth (A.B., High Point College), College Park, Maryland
 Stull, Don Lorain (A.B., Marshall University), Clifftop, West Virginia
 Summey, James Lester (B.A., Limestone College), Gastonia, North Carolina
 Swink, David Wesley (B.A., Furman University), Charleston, South Carolina
 Talley, Joseph Eugene (B.A., University of Richmond), Richmond, Virginia
 Tanner, William Douglas (A.B., Duke University), Rutherford, North Carolina
 Taylor, William Vinston (B.A., North Carolina Wesleyan College; Southeastern Baptist Theological Seminary), Stonewall, North Carolina
 Timm, Jeffrey Thomas (B.A., Texas Christian University), Tampa, Florida
 Treat, David Ralph (B.A., McMurry College), El Paso, Texas
 Trent, James Wilson, Jr. (B.A., Wake Forest University), Durham, North Carolina
 Turner, Charles McNeill, Jr. (A.B., Pfeiffer College), Reidsville, North Carolina
 Turner, Jerry Roscoe (B.A., Huntingdon College), Luverne, Alabama
 Turner, William Clair, Jr. (B.S., Duke University), Richmond, Virginia
 Vagt, Robert Frederick (A.B., Davidson College), Naugatuck, Connecticut
 Venter, David William (B.A., Mount Union College), New Kensington, Pennsylvania
 Walker, Anita (B.S., Mars Hill College; M.A., Appalachian State University), Durham, North Carolina
 Walker, Eddie Arnold (B.A., Elon College), Burlington, North Carolina
 Walker, Larry Allen (B.A., David Lipscomb College; Harding College), Burlington, North Carolina
 Wallace, Randall Thurman (A.B., Duke University), Lynchburg, Virginia
 Waters, John B., Jr. (B.A., Wofford College), Kingstree, South Carolina
 Watkins, LeRoy (B.A., McMurry College), Jal, New Mexico
 Watson, Thomas Richard (A.B., Duke University), Wilson, North Carolina
 Watts, Steven Miles (B.A., Appalachian State University), Durham, North Carolina
 Webb, S. Arthur (B.A., Furman University), Orlando, Florida
 Wells, Woodrow Wilson, Jr. (B.A., Methodist College), Fayetteville, North Carolina
 White, John Bradley (B.A., Emory and Henry College), Pulaski, Virginia
 Wiggins, Ellwood Holler (A.B., Wofford College), Summerville, South Carolina
 Wilbourne, Henry Bryant (B.A., Randolph-Macon College), Halifax, Virginia
 Williams, Phillip Eldridge (A.B., Guilford College), Greensboro, North Carolina
 Williford, Gladys Ruth (B.S., Teacher's College, State University of New York at Oneonta), Smithfield, North Carolina
 Wilson, Earl, Jr. (B.A., Shaw University), Raleigh, North Carolina
 Wingard, Linda Cathey (B.A., University of South Carolina), Pelion, South Carolina
 Wittig, Nancy Hatch (A.B., University of North Carolina), Leesburg, Virginia
 Wittig, Richard Andrew (B.A., Randolph-Macon College), Maplewood, New Jersey
 Wright, John Tyson (B.A., Ursinus College), Trainer, Pennsylvania

Candidates for the Master of Theology Degree

Connors, Robert Quinn (B.A., Mount Carmel College; M.A., University of Illinois: S.T.B., Catholic University), Washington, D.C.
 Forringer, Julie (B.A., Mount Union College, M.Div., Duke University), Durham, North Carolina
 Halbrook, John Harvey (B.A., Carson-Newman College; M.Div., Duke Divinity School), Durham, North Carolina
 Joffrion, Felix H., Jr. (B.A., University of Alabama; M.Div., Virginia Theological Seminary), Vicksburg, Mississippi

Lewis, Elroy (B.S., A&T State University; M.Div., Duke University), Bladenboro, North Carolina
 Puckett, Andrew Clay (B.A., Vanderbilt University; B.D., Southeastern Baptist Seminary),
 Columbus, Mississippi
 Tingle, James Arthur (B.A., Wake Forest University; B.D., Candler Theological Seminary), Al-
 liance, North Carolina

Candidates for the Master of Religious Education

Buckner, Clyde Van (B.M., Westminster Choir College), Durham, North Carolina
 Carpenter, Ina Mason (B.S., University of Kentucky), Durham, North Carolina
 Downs, Beth Cronister (B.A., Salem College), Greenville, South Carolina
 Stevens, Sharon Anne (B.A., Southwestern University), Waco, Texas
 Thistlethwaite, Susan Brooks (B.A., Smith College), River Edge, New Jersey
 Walsh, (Sister) Miriam (B.S.S.S., Loyola College), Baltimore, Maryland

SPECIAL STUDENTS

Alvord, Alexander M. (B.S., Washington State University; B.D., Pacific School of Religion;
 Th.M., Duke University), Salisbury, Rhodesia
 Baldwin, Linda Carol (B.A., Mars Hill College), Eden, North Carolina
 Hoover, George Kenneth (B.A., University of Richmond), Portsmouth, Virginia
 McIlrath, Leo Edward (B.A., Bonaventure University), Durham, North Carolina
 Newman, Barbara Buck (St. Mary's Junior College), Jacksonville, Florida
 Whelchel, Love Henry (B.A., Paine College; S.T.B., Boston University), Durham, North
 Carolina
 Wright, Jeannene Irene (B.S., Iowa State University; Princeton Theological Seminary),
 Mediapolis, Iowa

ENROLLMENT—GRADUATE DIVISION OF RELIGION 1971-72

Belk, Bonnie F. (B.A., Campbell College), Indian Trail, North Carolina
 Blair, Thom W., Jr. (B.A., Davidson College; B.D., Virginia Theological Seminary), Key West,
 Florida
 Boger, Jennifer L. (B.A., University of Southern California; M.A.R., Yale Divinity School),
 Burbank, California
 Boulton, Wayne G. (B.A., Lafayette College; B.D., McCormick Seminary), Avon, Connecticut
 Bozeman, T. Dwight (B.A., Florida Presbyterian College; B.D., Union Seminary in New
 York; Th.M., Union Seminary, Richmond), Bradenton, Florida
 Breyspraak, William A. (B.A., Southwestern at Memphis; M.Div., Duke Divinity School),
 Memphis, Tennessee
 Campbell, Dennis M. (B.A., Duke University; B.D., Yale Divinity School), Elmwood Park,
 Illinois
 Casto, R. Michael (B.Sc., Ohio State University; M.Div., Methodist Theological School in
 Ohio), Columbus, Ohio
 Chase, Carole F. (B.A., College of William and Mary; M.A., Presbyterian School of Chris-
 tian Education), Richmond, Virginia
 Churchill, Larry R. (B.A., Southwestern at Memphis; M.Div., Duke Divinity School), Rus-
 sellville, Arkansas
 Culpepper, Richard A. (B.A., Baylor University; M.Div., Southern Baptist Theological Sem-
 inary), Atlanta, Georgia
 Dietz, John F. (B.A., Muskingum College; M.A., Tufts University; M.Div., Pittsburgh Theolog-
 ical Seminary), Pittsburgh, Pa.
 Durway, Daniel L. (B.A., University of Texas; B.D., Austin Presbyterian Theological Seminary),
 Charlotte, North Carolina
 Erickson, Ray J. (B.A., Princeton University), Orange, New Jersey
 Fairbairn, J. Ronald (B.A., Baylor University; B.D., Southern Baptist Theological Seminary),
 Louisville, Kentucky
 Fennema, David A. (B.A., Calvin College; B.D., Western Theological Seminary), Holland,
 Michigan
 Gentle, Brian G. (B.A., Wheaton College; B.D., Yale Divinity School; M.A., Columbia Uni-
 versity), Norfolk Virginia

Glusman Edward F., Jr. (B.A., Louisiana State University; M.Div., Seabury-Western Theological Seminary), Baton Rouge, Louisiana
Hester, David C. (B.A., University of Maine; M.Div., Bangor Theological Seminary), Ogden, Utah
Hoyt, Thomas, Jr. (B.A., Lane College; B.D., Interdenominational Theological Center, Georgia; S.T.M., Union Theological Seminary, NYC), Evansville, Indiana
Johnston, Robert K. (B.A., Stanford University; B.D., Fuller Theological Seminary), Chicago, Illinois
Keller, Roger R. (B.Mus., University of Colorado; M.Div., Princeton Theological Seminary), Boulder, Colorado
Kirkham, Donald H. (B.A., University of Sydney; M.Ed., University of Sydney; B.D., Drew University), Nowra, N.S.W., Australia
Kline, Lawrence O. (B.A., Drew University; B.D., Drew University; M.L.S., Rutgers University; M.A., New York University), Waverly, New York
Lindley, Susan H. (B.A., Mt. Holyoke College), Pittsburgh, Pennsylvania
Martin, Richard M. (B.A., Birmingham-Southern; M.Div., Duke Divinity School), Birmingham, Alabama
Nagakubo, Senzo (B.A., Japan Missionary College; M.A., Potomac University; B.D., Th.M., Andrews University), Wakamatsu City, Fukushima Ken, Japan
Pratt, Lindsay P. (B.A., Wake Forest College; M.Div., Crozer Theological Seminary), Goldsboro, North Carolina
Price, Jane Bostian (B.A., Salem College; M.A., Duke University), Granite Quarry, North Carolina
Price, Robert E. (B.A., Columbia College; B.D., Union Theological Seminary, NYC), Little Rock, Arkansas
Quinn, Wylie S. (B.A., Davidson College; B.D., S.T.M., Yale Divinity School), Gastonia, North Carolina
Rhoads, David M. (B.A., Gettysburg College; B.D., Gettysburg Seminary), Hollidaysburg, Pennsylvania
Ritchie, B. Maurice (B.A., Davidson College; B.D., Th.M., Duke Divinity School), Concord, North Carolina
Sapp, J. Steven (B.A., Duke University; M.Div., Duke Divinity School), Asheville, North Carolina
Sell, Jesse J. (B.A., Ohio Wesleyan University; B.D., Duke Divinity School), Columbus, Ohio
Shoemaker, Steven R. (B.A., Wheaton College; B.D., S.T.M., McCormick Seminary), Urbana, Illinois
Stevens, Donald J. (B.A., University of Notre Dame; M.A., Columbia University), Chicago, Illinois
Wappler, Edwin G. (B.A., Northwestern University; B.D., S.T.M., Seabury-Western Theological Seminary), Des Plaines, Illinois
Weaver, J. Denny (B.A., Goshen College; M.Div., Goshen Biblical Seminary), Kansas City, Kansas
White, C. Denny, Jr. (B.A., Duke University; M.Div., Duke Divinity School), Gastonia, North Carolina
White, Leland J. (B.A., St. Mary's Seminary and University; S.T.B., S.T.L., Pontificia Universitas Gregoriana, Rome, Italy), Charleston, South Carolina
Wilson, J. Christian (B.A., Duke University; M.Div., Th.M., Duke Divinity School), Winston-Salem, North Carolina
Wilson, John W. (N.S.W., Australia, Teachers Certificate; B.D., University of London; S.T.M., Yale Divinity School), N.S.W., Australia
Yeager, Diane M. (B.A., Ohio University), Mansfield, Ohio

INSTITUTIONS REPRESENTED

Adrian College.....	2	Ashland Theological Seminary.....	1
Agricultural and Technical State University of North Carolina.....	3	Atlantic Christian College.....	1
Albany Medical School.....	1	Auburn University.....	1
Albright College.....	1	Austin College.....	1
Appalachian State University.....	2	Averett College.....	1
Arkansas Agricultural and Mechanical College.....	1	Baker University.....	1
Ashland College.....	1	Baylor University.....	1
		Brown University.....	1

California Baptist College.....	1	McMurry College.....	4
Campbell College.....	3	Marshall University.....	3
Candler School of Theology.....	1	Mars Hill College.....	4
Carson and Newman College.....	2	Mercer University.....	1
Catawba College.....	1	Methodist College.....	7
Catholic University.....	1	Michigan State University.....	2
Centenary College of Louisiana.....	2	Middlebury College.....	1
Central Methodist College.....	1	Mississippi State University.....	1
Centre College of Kentucky.....	3	Mount Carmel College.....	1
Christ the King Seminary.....	1	Mount Union College.....	4
Colgate University.....	2	Nebraska Wesleyan University.....	1
College of William and Mary.....	3	Newberry College.....	1
College of Wooster.....	1	North Carolina Central University.....	1
Colorado Agricultural and Mechanical University.....	1	North Carolina State University.....	3
Converse College.....	1	North Carolina Wesleyan College.....	5
David Lipscomb College.....	1	Oklahoma City University.....	1
Davidson College.....	1	Ouachita Baptist University.....	1
Denison University.....	1	Pacific School of Religion.....	1
DePauw University.....	1	Paine College.....	1
Duke Divinity School.....	2	Patrick Henry College.....	1
Duke University.....	16	Pembroke State University.....	3
East Carolina University.....	2	Pfeiffer College.....	5
Eastern Michigan University.....	1	Princeton University.....	1
Eastern Pilgrim College.....	1	Purdue University.....	1
East Tennessee State University.....	1	Randolph-Macon College.....	4
Elon College.....	4	Sacred Heart College.....	1
Emory and Henry College.....	3	Saint Andrew's University.....	1
Florida Atlantic University.....	1	Saint Bonaventure.....	1
Florida Southern College.....	3	Salem College.....	1
Furman University.....	8	Shaw University.....	1
Gardner-Webb College.....	1	Simpson College.....	3
Gaston College.....	1	Smith College.....	1
Georgetown College.....	3	Southeastern Baptist Seminary.....	1
Greensboro College.....	2	Southern Baptist Theological Seminary	2
Grinnell College.....	1	Southwestern at Memphis.....	1
Grove City College.....	1	Southwestern University.....	1
Guilford College.....	1	State University of New York at Albany	2
Hanover College.....	1	Teacher's College at Oneonta.....	1
Hendrix College.....	1	Tennessee Polytechnical Institute.....	1
High Point College.....	5	Tennessee Technical University.....	1
Hiwassee College.....	1	Tennessee Wesleyan College.....	1
Howard Payne College.....	1	Texas Christian University.....	1
Howard University School of Religion	1	Texas Technical University.....	1
Huntingdon College.....	2	Texas Wesleyan College.....	1
Illinois Wesleyan University.....	1	Tulane University.....	1
Iowa Wesleyan College.....	1	Troy State University.....	1
Johnson C. Smith University.....	1	Union College.....	2
Kent State University.....	1	Union Theological Seminary (New York)	1
LaGrange University.....	1	United Theological Seminary.....	1
LeMoyne College.....	1	University of Alabama.....	3
Lenoir Rhyne College.....	1	University of Arkansas.....	4
Limestone College.....	2	University of Cincinnati.....	1
Livingstone College.....	1	University of Colorado.....	2
Louisiana State University.....	1	University of Delaware.....	1
Louisiana Technical University.....	1	University of Florida.....	1
Loyola College.....	1	University of Georgia.....	2
Lynchburg College.....	2	University of Houston.....	1
		University of Illinois.....	1
		University of Kentucky.....	1

University of Maryland.....	1	Virginia Seminary and College.....	1
University of Mississippi.....	1	Virginia State College.....	1
University of North Carolina.....	20	Virginia Theological Seminary.....	3
University of Richmond.....	2	Wake Forest University.....	5
University of South Alabama.....	3	Washington and Lee University.....	2
University of South Carolina.....	1	Washington State University.....	1
University of Southwest Louisiana....	1	Westminster Choir College.....	2
University of Tennessee.....	5	Western Carolina University.....	2
University of Virginia.....	2	Western Maryland College.....	1
Ursinus College.....	1	West Virginia University.....	3
Vanderbilt University.....	1	Wofford College.....	4
Virginia Polytechnic University.....	2	Yale University.....	
Virginia Professional Institute.....	1		

DENOMINATIONS REPRESENTED—1971-72*

United Methodist	167	Assembly of God	1
Baptist	21	Church of Christ	1
United Church of Christ	11	Disciples of Christ	1
Presbyterian	7	First Christian	1
Southern Baptist	7	Free Will Baptist	1
Episcopal	4	Holiness	1
Roman Catholic	5	Lutheran	1
Presbyterian, U.S	3	Pentecostal Holiness	1
Christian Methodist Episcopal	2	Reformed Church in America	1
Moravian	2	Religious Society of Friends	1
African Methodist Episcopal	1	Society of Friends	1
African Methodist Episcopal Zion	1	United Holy Church	1
Apostle Church of Christ in God	1		

GEOGRAPHICAL DISTRIBUTION 1971-72

North Carolina	95	New York	4
Virginia	25	Illinois	3
South Carolina	16	Kentucky	3
Texas	9	Michigan	3
Florida	9	Mississippi	3
Alabama	7	Ohio	3
West Virginia	7	Delaware	2
Pennsylvania	6	Iowa	2
Tennessee	6	Missouri	2
Georgia	5	Oklahoma	2
New Jersey	5	Washington, D.C.	2
Arkansas	4	California	1
Indiana	4	Colorado	1
Louisiana	4	Connecticut	1
Maryland	4	New Mexico	1
Massachusetts	4	Rhodesia	1

ENROLLMENT SUMMARY 1971-72*†

Divinity School Students, 245 (225 M.Div., 6 M.R.E., 7 Th.M., 7 special); Graduate Division of Religion Students, 44; Total, 289.

*The statistics do not include students of the Graduate Division of Religion.

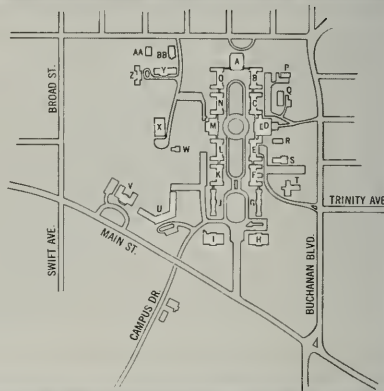
†Includes each student other than auditors who registered.



MAP OF DUKE UNIVERSITY

East Campus

- | | |
|---------------------------|------------------------|
| A Baldwin Auditorium | O Pegram House |
| B Bassett House | P Duke Press |
| C Brown House | Q Infirmary |
| D Union Building | R Ark |
| E Faculty Apartments | S Crowell Building |
| F Art Museum, Geology | T Epworth Inn |
| G Aycock House | U Gilbert-Addoms House |
| H East Duke Building | V Southgate Hall |
| I West Duke Building | W Campus Center |
| J Jarvis House | X Woman's College |
| K Carr Building | Y Asbury Building |
| L Giles House | Z Bivins Building |
| M Woman's College Library | AA Art Building |
| N Alspaugh House | BB Branson Building |



West Campus

- | | | | |
|--------------------------|--------------------------|----------------------|-----------------------------|
| A Duke Chapel | H Hospital Main Entrance | O Craven Quadrangle | V Card Gymnasium |
| B Divinity School | I Gerontology, D & T, | P Wannamaker Hall | W Indoor Stadium |
| C Gray Building | Clinical Research | Q Crowell Quadrangle | X School of Law |
| D Perkins Library | J Duke Hospital | R Clock Tower Court | Y Gross Chemical Laboratory |
| E Language Center | K Sociology, Psychology | S Kilgo Quadrangle | Z Biological Sciences |
| F Old Chemistry Building | L Social Sciences | T Union Building | AA Plant Environment |
| G Davison Building | M Alien Building | U Flowers Building | Laboratory |
| School of Medicine | N Few Quadrangle | Page Auditorium | BB Physics Building |
| | | | CC Nuclear Laboratory |
| | | | DD School of Engineering |
| | | | EE Army Research |
| | | | FF Medical Center Research |
| | | | Buildings |
| | | | GG Nanaline H. Duke Medical |
| | | | Sciences Building |
| | | | HH Warehouse, Shop |
| | | | II Bell Building |
| | | | JJ Hanes House |
| | | | School of Nursing |
| | | | KK Hanes House Annex |
| | | | LL Pickens Rehabilitation |
| | | | Center |
| | | | MM Graduate Center |
| | | | NN Alumni House |
| | | | OO Commonwealth-Studies |
| | | | Center |
| | | | PP Personnel Office |
| | | | QQ International House |
| | | | RR Personnel Office |
| | | | SS Education Improvement |
| | | | Program, |
| | | | A Better Chance Program |
| | | | International Studies |
| | | | Center |
| | | | UU Campus Stores Office |
| | | | VV Office of Institutional |
| | | | Advancement |
| | | | VW Information Services |
| | | | Visitors Bureau |
| | | | XX Admissions Office |
| | | | YY Edens Quadrangle |
| | | | ZZ Wade Stadium |



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Divinity School

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